Park Issues

9

Issues: Aquatic Invaders

During the late 1880s when the Army administered Yellowstone National Park, the U.S. Fish Commission (a predecessor of today's U.S. Fish and Wildlife Service) was invited to stock non-native fish in some park waters. These stockings comprise the first known, deliberate introductions of non-native fish to Yellowstone. Four trout species were introduced—brook, brown, lake, and rainbow. They have hybridized with native trout and caused a loss of genetic diversity.

The other invasive aquatic species—New Zealand mud snail and the microorganism causing whirling disease—probably arrived via unaware boaters and anglers carrying the organisms from other fishing locations around the country.

Angler and boater introduction of aquatic invasive species remain a serious threat to Yellowstone's aquatic ecosystem. Presently, invasive exotic aquatic species occur in streams, rivers, and lakes (both near the coasts and inland) all across the United States. We may never know exactly how whirling disease or mud snails were introduced to the park's waters, but anglers can help prevent other species from arriving.

For this reason, Yellowstone is publicizing this issue through a brochure and other information available to anglers and boaters who pursue their recreation in the park. The park's efforts join those of other agencies in the region and the nation working to protect the nation's aquatic ecosystems.

Mud Snails

The New Zealand mud snail has invaded park waters. About one-quarter inch long *(photo at right),* the New Zealand mud snail forms dense colonies on aquatic vegetation and rocks along streambeds. The snails crowd out native aquatic insect communities, which are a primary food source for fish. They also consume a majority of algae growth in park streams, another primary food source for fish and other native species. Strategies for dealing with this invader are being developed.

The Issue

Aquatic invaders can irreversibly damage the park's naturally functioning ecosystems.

Current Status

- In the U.S. currently, more than 250 exotic (from another continent) aquatic species and more than 450 non-native (moved outside their natural range) aquatic species exist.
- At least 3 invasive aquatic species exist in Yellowstone's waters:
  1 mollusk
  1 fish
  1 exotic disease-causing microorganism
- Park staff continues to educate visitors about preventing the spread of aquatic invasive species.

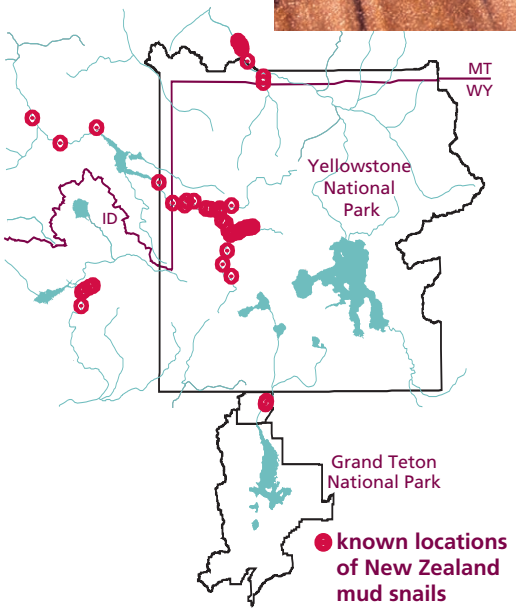
Recommendations for the Public

Clean Your Boat! Clean Your Gear!

- Remove all plants, animals, mud, sand, and other debris from your boat and equipment.
- Rinse your boat, trailer, and equipment with high-pressure hot water.
- Drain lake and river water from your boat bilge area, livewell, and other hidden compartments, away from park waters.
- Dispose of all bait before entering the park. Otherwise, seal bait in plastic bags and place in park trash containers.
- Dry all equipment in the sun for up to 5 days or treat equipment with a 10 percent bleach solution.

Repeat all of the above before you leave Yellowstone National Park.

New Zealand mud snails



9

Aquatic Invaders: Lake Trout

Lake Trout
Non-native lake trout have been found in Yellowstone Lake and threaten the survival of native Yellowstone cutthroat trout and other species that depend on the native trout.

History/Background
- During the time that the park stocked fish, lake trout were introduced to Lewis and Shoshone lakes.
- In 1994, an angler caught the first verified lake trout in Yellowstone Lake.
- No one knows how lake trout were introduced into Yellowstone Lake, but it probably occurred several decades ago.
- One lake trout can consume approximately 41 cutthroat trout per year.
- If no action is taken, cutthroat trout in Yellowstone Lake could decline 50–90% in 20 years.
- Many wildlife species, including the grizzly bear and bald eagle, may depend on the cutthroat trout for a portion of their diet.
- Most predators can't catch lake trout because they live at greater depths than cutthroat trout, spawn in the lake instead of shallow tributaries, and are too large for many predators.

Current Status
- The fisheries staff is removing lake trout by gill-netting: more than 130,000 lake trout have been removed this way since the mid-1990s.
- Regulations encourage anglers to catch lake trout; approximately 5,000 per year are caught.
- Biologists are researching the abundance and distribution of lake trout in Yellowstone Lake.
- With continued aggressive control efforts, lake trout numbers can be reduced and the impacts to cutthroat trout lessened.

The lake trout is a large and aggressive predatory fish that has decimated cutthroat trout in other western waters. If its population is not controlled in Yellowstone Lake, the impacts will reach far beyond the cutthroat trout population. It has the potential to be an ecological disaster.

Tracking Lake Trout

Lake trout gill-netting begins after ice is gone from the lake, and continues into October. Since lake trout control operations began in the mid-1990s, more than 130,000 lake trout have been caught. Gill net operations also provide valuable population data—numbers, age structure, maturity, and potential new spawning areas—leading to more effective control of this species. For example, during 1996, a lake trout spawning area was discovered in the West Thumb region of Yellowstone Lake at Carrington Island. Since then, scientists found spawning areas in West Thumb between Breeze Point and the mouth of Solution Creek, and off the geyser basin.

Hydroacoustic work (using sonar-based fish finders) in 1997 confirmed lake trout were concentrated in the western portion of Yellowstone Lake. These surveys also revealed medium-sized (12–16 inches) lake trout tended to reside in deeper water (greater than 130 feet) than Yellowstone cutthroat. Now scientists can more easily target lake trout without harming cutthroat trout. Hydroacoustic data also provides minimum abundance estimates of both cutthroat and lake trout, which is invaluable information for long-term evaluation of our efforts.

Anglers are an important component in the lake trout management program. They have had the most success in catching lake trout between 15 and 24 inches long. These fish are found in shallow, near-shore waters in June and early July. Anglers have taken approximately 4–5 percent of the lake trout removed from Yellowstone Lake. Fishing regulations require anglers to kill all lake trout caught in Yellowstone Lake and its tributaries. In 2001, regulations further restricted all cutthroat trout fishing to catch-and-release.

About 80 percent of a mature lake trout's diet consists of cutthroat trout. Based on lake trout predation studies in Yellowstone Lake, fisheries biologists estimate that approximately 41 cutthroat trout are saved each year for every lake trout caught.

Lake trout probably can't be eliminated from Yellowstone Lake. However, ongoing management of the problem can control lake trout population growth, maintain the cutthroat trout population, which are a critical ecological link between Yellowstone Lake and its surrounding landscape.

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Aquatic Invaders: Whirling Disease

The Madison River in western Montana has long been considered a stable, world-class trout fishery. However, beginning in 1991, studies in a section of the river outside Yellowstone National Park indicated this was changing. The population of rainbow trout in the study section was declining dramatically. Testing completed in late 1994 confirmed the presence of whirling disease, which scientists believe is one of the factors in the decline.

Whirling disease is caused by a microscopic parasite that can infect trout and salmon; it does not infect humans. The parasite attacks the developing cartilage of fish between 1–6 months old and causes deformities of the bony structures. An infected fish may have a deformed head and tail, blackened areas of the tail, and whirling swimming behavior. It may be unable to feed normally and is vulnerable to predation.

Whirling Disease

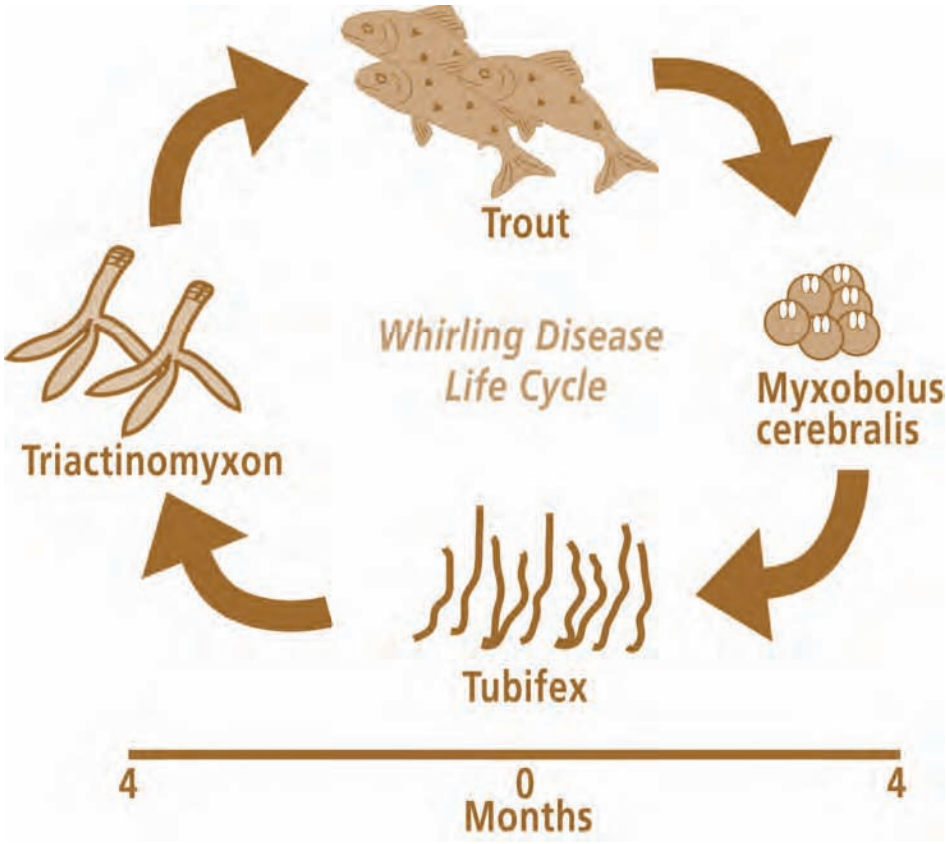
Whirling disease is caused by a parasite attacking the developing cartilage of young fish, resulting in skeletal deformities and sometimes whirling behavior. Affected fish cannot feed normally and are vulnerable to predation.

History/Background

- The disease was first described in Europe more than 100 years ago. It was detected in the U.S. in the mid-1950s.
- It most likely came to the U.S. in frozen fish products.
- Whirling disease has been confirmed in 20 states and appears to be rapidly spreading throughout the western United States.
- Rainbow trout populations appear to be most susceptible to the disease; recent laboratory tests suggest cutthroat trout are also highly susceptible. Lake trout and grayling appear immune to the disease, and brown trout are resistant, but can be infected and can carry the parasite.
- There is no treatment for the disease.

Current Status

- Testing for whirling disease continues throughout the park.
- Pelican Creek's population of migratory cutthroat trout is probably gone.



Little information exists on how the parasite moves from one drainage to another in the wild. In Montana, it is in the Madison, Gallatin, and Yellowstone rivers. In Yellowstone National Park, severe infections exist in the Yellowstone River and Pelican Creek; light infections exist in Clear Creek and the Firehole River. It has decimated the cutthroat trout population in Pelican Creek.

In a June 1996 report, the Whirling Disease Task Force (Montana) stated that whirling disease is "the most significant threat to wild, native and nonnative naturally reproducing trout populations in Montana," and "the relevant question appears no longer to be if whirling disease will spread, but how long it will take."

No effective treatment exists for wild trout infected with this disease or for the waters containing infected fish. Therefore, anyone participating in water-related activities—including anglers, boaters, or swimmers—are encouraged to take steps to help prevent the spread of the disease. This includes thoroughly cleaning mud and aquatic vegetation from all equipment and inspecting footwear before moving to another drainage. Anglers should not transport fish between drainages and should clean fish in the body of water where they were caught.

Round goby

Bighead carp

The zebra mussel clogs water intakes, crowds out bottom invertebrates, and reduces lake productivity.

Not shown: three species of zooplankton, which can displace native zooplankton species that are important food for Yellowstone's native cutthroat trout. Furthermore, the three species of exotic zooplankton have long spines, which make them difficult for young fish to eat.

More Invaders on Their Way

Several exotic aquatic species are spreading through the United States, among them the species shown here. Fisheries biologists believe they are moving toward Yellowstone rapidly, and may appear in park waters very soon. Their arrival might be delayed if anglers remember:

- It is illegal to use any fish as bait in Yellowstone National Park.
- It is illegal to transport fish among any waters in the Yellowstone region.
- It is illegal to introduce fish species of any kind to Yellowstone waters.

Eurasian water-milfoil

Eurasian water-milfoil has spread throughout 45 of the 48 contiguous United States. Montana, Wyoming, and Maine are the three states still free of this aquatic invader.

This exotic aquatic plant lives in calm waters such as lakes, ponds, and calm areas of rivers and streams. It grows especially well in water that experiences sewage spills or abundant motorboat use, such as Bridge Bay.

Eurasian water-milfoil colonizes via stem fragments carried on boating equipment, which is another reason why boats should be thoroughly cleaned, rinsed, and inspected before entering Yellowstone National Park.

9

Issues: Bioprospecting & Benefits-sharing

Yellowstone's hydrothermal microbes (called thermophiles) have been the subject of scientific research and discovery for more than 100 years. One of these discoveries—of the uses for *Thermus aquaticus*—has led to scientific and economic benefits far beyond what anyone could have imagined. Today, several dozen scientific research projects—sponsored by universities, NASA, and corporations—are underway in the park to investigate thermophiles. *(See Chapter 4 for more information on these life forms.)* Some of their discoveries have been used for commercial purposes, which is the heart of the benefits-sharing issue.

History

Careful scientific study of these curious life forms began in earnest in 1966, when Dr. Thomas Brock discovered a way to grow one of the microorganisms living in the extraordinarily hot waters (more than 158°F/70ºC) of Mushroom Pool in the Lower Geyser Basin. This bacterium, *T. aquaticus,* proved essential to one of the most exciting discoveries in the 20th century.

Two decades ago, our ability to study DNA was limited. Things we take for granted today such as DNA fingerprinting to identify criminals, DNA medical diagnoses, DNA-based studies of nature, and genetic engineering were unimaginable. But in 1985, the polymerase chain reaction (PCR) was invented. PCR is an artificial way to do something that living things do every day—replicate DNA. PCR is the rocket ship of replication, because it allows scientists to make billions of copies of a piece of DNA in a few hours. Without PCR, scientists could not make enough copies of DNA quickly enough to perform their analyses. An enzyme discovered in *T. aquaticus*—called Taq polymerase—made PCR practical. Because it came from a thermophile, Taq polymerase can withstand the heat of the PCR process without breaking down like ordinary polymerase enzymes. A laboratory version of this enzyme is now used and has allowed DNA studies to be practical and affordable.

Many other species of microbes have been found in Yellowstone since 1966. Each of these thermophiles produces thousands of

Section revised & updated

The Issue

Should researchers who study material obtained under a Yellowstone National Park research permit be required to enter into benefits-sharing agreements with the National Park Service before using their research results for any commercial purpose?

Definitions

Bioprospecting is the search for useful scientific information from genetic or biochemical resources. It does not require large-scale resource consumption typical of extractive industries associated with the term "prospecting" such as logging and mining.

Benefits-sharing is an agreement between researchers, their institutions, and the National Park Service that returns benefits to the parks when results of research have potential for commercial development.

History

1966: The microorganism *Thermus aquaticus* was discovered in a Yellowstone hot spring.

1985: An enzyme from *T. aquaticus,* which is synthetically reproduced, contributed to the DNA fingerprinting process that has earned hundreds of millions of dollars for the patent holder.

1997: The park signed a benefits-sharing agreement with Diversa Corporation, ensuring a portion of their future profits from research in Yellowstone National Park will go toward park resource preservation.

1999: A legal challenge put on hold implementation of this agreement until an environmental analysis (EA or EIS) is completed.

Current Status

- NPS is conducting an environmental impact statement (EIS) to decide whether benefits-sharing should be a part of NPS policy for parks nationwide. It will examine the potential impacts of implementing and not implementing benefits-sharing agreements.
- Each year, approximately 40 research permits are granted to scientists to study microbes in Yellowstone. Research permits are only granted for projects that meet stringent park protection standards.
- Research microbiologists continue to find microorganisms in Yellowstone that provide insights into evolution, aid in the search for life on other planets, and reveal how elements are cycled through ecosystems.

See Chapter 4, "Thermophiles."

9 Bioprospecting & Benefits-sharing

Dr. Thomas Brock

uncommon, heat-stable proteins, some useful to scientists. Researchers estimate more than 99 percent of the species actually present in Yellowstone's hydrothermal features have yet to be identified.

Science

Because much of modern biotechnology is based on the use of enzymes in biochemical reactions—including genetic engineering, fermentation, and bioproduction of antibiotics—heat-stable catalytic proteins that allow reactions to occur faster are increasingly important in the advancement of science, medicine, and industry. In addition, genetic studies using knowledge developed from the study of microbes is increasingly important to medical and agricultural research. Yellowstone's geology provides a wide variety of high-temperature physical and chemical habitats that support one of the planet's greatest concentrations of thermophilic biodiversity. Research on these thermophiles can contribute to further advances.

Ongoing Research

Approximately 40 research studies are being conducted in Yellowstone on the ecological roles and community dynamics of microorganisms, and how to search for traces of similar life forms in the inhospitable environments of other planets. Research on park microbes also has proved useful in producing ethanol, treating agricultural food waste, bioremediating chlorinated hydrocarbons, recovering oil, biobleaching paper pulp, improving animal feed, increasing juice yield from fruits, improving detergents, and a host of other processes.

Controversy

Along with this exciting new dimension in understanding park resources through research, questions have been raised about whether or not bioprospecting should be allowed. Bioprospecting is biological research associated with the development of commercial products. Bioprospecting does not require the sort of grand-scale resource consumption required by the kinds of extractive industries typically associated with the term "prospecting," such as timber harvesting and mining. In this case, the "prospecting" is for new knowledge. As required by law, research is encouraged in Yellowstone if it does not adversely impact park resources and visitor use and enjoyment. Importantly, only research results, i.e. information and insight gained during research on park specimens, may be commercialized—*not the specimens themselves.* Nonetheless, some people question the appropriateness of allowing scientists to perform research in a national park if they are bioprospectors.

The most famous commercial application for Yellowstone-related research was the invention of the polymerase chain reaction (PCR), discussed above. PCR generated significant profits for Cetus Corporation, which had patented the processes. In 1991, Hoffman-La

Roche, a Swiss pharmaceutical company, purchased the U.S. patents for a reported $300 million. Since then, annual sales of Taq polymerase have been approximately $100 million. Yellowstone National Park and the United States public have received no direct benefits even though this commercial product was developed from the study of a Yellowstone microbe. Hoffman-La Roche and the researchers acted lawfully throughout the development and sales of Taq polymerase. At issue is whether or not the National Park Service (NPS) should require researchers who study material obtained under a research permit to enter into benefits-sharing agreements with NPS before using their research results for any commercial purpose.

Benefits-Sharing

Federal legislation authorizes the National Park Service to negotiate benefits-sharing agreements that provide parks a reasonable share of profits when park-based research yields something of commercial value. Similar agreements are used by other countries to allow the host nation to benefit from commercial discoveries that depended on its natural heritage. In 1997, Yellowstone National Park became the first U.S. national park to enter into a benefits-sharing agreement with a commercial research firm. The Yellowstone–Diversa Cooperative Research and Development Agreement (CRADA) provided that Diversa Corp. would pay Yellowstone $100,000 over five years (even if research resulted in no commercially valuable discoveries) and included provisions of no-cost scientific analyses and laboratory equipment, plus a royalty based on any sales revenues related to results from research in the park. *The CRADA did not authorize Diversa to collect specimens or conduct research in the park.* Permission to conduct research can only be acquired by applying for a research permit. In Yellowstone, an interdisciplinary team requires research permit applicants to abide by strict resource protection standards. Diversa, which has research sites around the world, was collecting DNA samples directly from nature and screening the genes for the ability to produce useful compounds. In its labs, scientists splice the most useful genes into microbial "livestock," and these microbes then produce the compound or enzyme. As with all NPS research specimens, the Yellowstone microbes and DNA collected in the park remain in federal ownership and are never sold.

Into Court

Shortly after the Yellowstone-Diversa CRADA was signed, opponents sued NPS in federal court arguing that the policy put into play a new commercial activity and was illegal and inappropriate in parks. In 1999, the judge ordered NPS to prepare an environmental analysis of the potential impacts of benefits-sharing agreements and suspended the CRADA pending completion of the analysis. In 2000, the court dismissed the remainder of the case, ruling the CRADA: 1) was consistent with the NPS mission of resource conservation; 2) that bioprospecting did not constitute a consumptive use; 3) that bioprospecting did not represent a "sale or commercial use" of park resources; and 4) Yellowstone fell within the definition of a federal laboratory and appropriately implemented the CRADA.

Thermus aquaticus, *magnified*

NPS is conducting an environmental impact statement (EIS) to decide whether benefits-sharing should be a part of NPS policy for parks nationwide. Through a public process, the EIS will examine the potential impacts of implementing and not implementing benefits-sharing agreements.

The study of natural resources has long been a source of knowledge that benefits humanity. For example, more than half of the pharmaceuticals used in the United States contain at least one major active compound derived from or patterned after natural compounds As global biodiversity declines, national parks and other preserves become increasingly important as sources of genetic diversity for scientific study to discover knowledge to develop new solutions to the problems faced by humanity.

For more detailed information, including the 2000 court decision, go to www.nature.nps.gov/benefitssharing

9

Issues: Bison Management

Section revised & updated

The Issue

About half of Yellowstone's bison test positive for exposure to brucellosis, a disease that can cause bison and domestic cattle to abort their first calf. Because Yellowstone bison migrate into Montana, their exposure to brucellosis concerns the state's cattle industry.

History/Background

(See also timeline on pages 150–151)

- Bison probably contracted brucellosis from domestic cattle raised in the park to provide milk and meat for park visitors in the early 1900s.
- Brucellosis has little impact on the growth of the bison population.
- The disease may be contracted by contact with infected tissue and birth fluids of infectious cattle or bison that are shed at the end of pregnancy.
- The human form of the disease, called undulant fever, was once a public health threat in the U.S., but is no longer.
- A vaccine used in cattle, RB51, is being used for bison.
- Bison have not been shown to transmit brucellosis to cattle under natural conditions although such transmission has occurred in captivity.
- The state of Montana, like other states, has spent much time, effort, and money attempting to eradicate brucellosis in cattle.
- Elk in the greater Yellowstone area also carry brucellosis.

Current Status

- A bison management plan has been in effect since December 2000.
- The plan allows for adaptive management, systematically increasing the winter range outside the park as partner agencies increase efforts to lower the disease prevalence in the population.
- As of March 2006, the plan is still in the initial phase, which does not yet provide additional winter range north of the Reese Creek area.

Agencies Involved

National Park Service (NPS)
Animal Plant Health Inspection Service (APHIS)
U.S. Forest Service (USFS)
Montana Department of Livestock (DOL)
Montana Department of Fish, Wildlife & Parks (FWP)

Bison outside the North Entrance in Gardiner, MT

About Brucellosis

Brucellosis, caused by the bacterium *Brucella abortus,* can cause pregnant cattle to abort their calves. The disease is transmitted primarily when uninfected, susceptible animals come into direct contact with infected birth material. No cure exists for brucellosis in wild animals. All cattle that use overlapping ranges with bison are vaccinated for brucellosis, as are bison released after capture.

Although rare in the United States, humans can contract brucellosis through unpasteurized, infected milk products or contact with infected birth tissue. *(Brucellosis cannot be contracted by eating meat from an infected animal.)* In humans, the disease is called undulant fever. With milk pasteurization, which is required by U.S. law, people in the United States have virtually no risk of contracting the disease. And if they do, they can be treated with antibiotics.

Brucellosis was discovered in Yellowstone bison in 1917. They probably contracted the disease from domestic cattle raised in the park to provide milk and meat for visitors staying at hotels. Now about 50 percent of the park's bison test positive for exposure to the brucella organism. However, testing positive for exposure (seropositive) does not mean the animal is infectious and capable of transmitting brucellosis. (For example, people who received smallpox immunization during their childhood will test positive for smallpox antibodies even though they are not infected with the disease and cannot transmit it.) Research indicates less than half of seropositive female bison are infectious at the time of testing. Male bison do not transmit the disease to other bison. (Transmission between males and females during reproduction is unlikely because of the female's protective chemistry.) Bison have a very low probability of transmitting brucellosis to cattle under natural conditions, in part because management strategies prevent bison from commingling with cattle.

So far, research shows that bison calves pose no risk to cattle. The risk of brucellosis transmission in the wild occurs only during the time afterbirth and its residue remain on the ground. Bison typically consume these materials.

Park managers face numerous uncertainties about how to best manage and preserve bison while addressing the issue of brucellosis-infected wildlife in Yellowstone National Park. In the absence of data to describe bison-*brucella* interactions, assumptions are based on the best available information. Studies conducted on cattle and *brucella* offer clues to how the disease may function in bison. Current information shows both species exhibit very similar clinical signs of brucellosis infection and very similar methods for transmitting the disease to other individuals. However, a scientific review of published and unpublished data indicates bison differ from cattle in their response to vaccines and possibly to standard testing for the disease. Elk in the Greater Yellowstone Ecosystem are also infected with brucellosis, and this reservoir for the disease may be a brucellosis transmission risk to bison. Studies are being conducted on wild bison to better understand the bison-*brucella* relationship, and to study these other questions.

Cattle–Bison Conflicts

Federal and state agencies and the livestock industry have spent much time and money to eradicate brucellosis from cattle. States accomplishing this task receive "brucellosis class-free" status and can export livestock without restrictions and costly disease testing. Montana attained this status in 1985.

Brucellosis infections in two Montana cattle herds would downgrade the state's status and affect the finances of ranchers. When one cow in a cattle herd becomes infected with brucellosis, the entire herd is quarantined and may be slaughtered. Federal and state indemnity funds partially compensate the livestock producer for this loss.

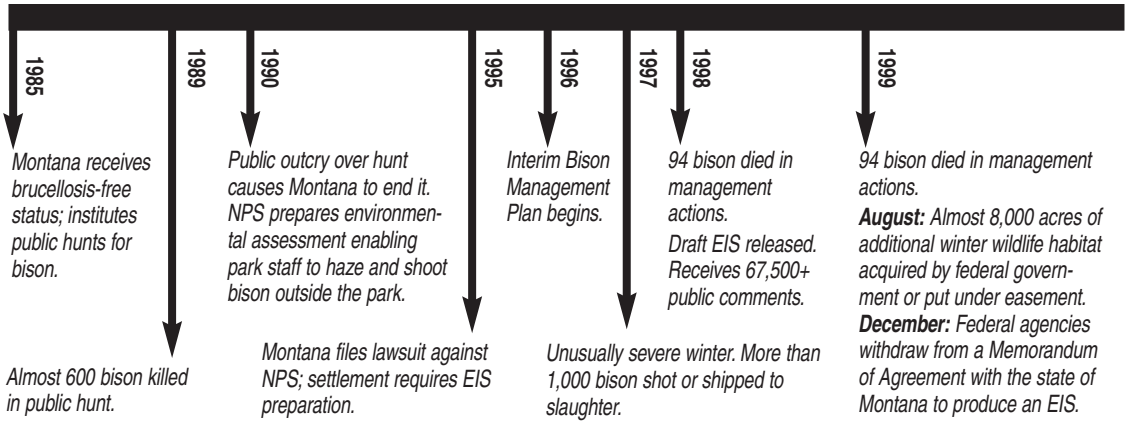
Because of concern over losing brucellosis class-free status, livestock regulatory agencies recommend an aggressive strategy to achieve the goal of brucellosis eradication. A National Academy of Sciences review panel suggested that brucellosis eradication is not possible in wildlife with the current technology. The panel recommended managing bison and livestock to minimize transmission risks.

Keeping bison and livestock separated is one part of the current interagency management plan *(described on pages 150–152).* Vaccinating cattle and bison is another. RB51 is a brucellosis vaccine safe for bison calves, yearlings, and adult males. Unlike with other vaccines, animals vaccinated with RB51 will not test positive for brucellosis with the standard battery of diagnostic tests. Vaccination of Yellowstone bison began in spring 2004.

Recent History

In 1985, Montana initiated a public bison hunt along the north boundary near Reese Creek and areas along the west boundary near West Yellowstone. During the severe winter following the fires of 1988, 569 bison were killed. The resultant nationwide public controversy caused the Montana Legislature to rescind authorization for the hunt.

Beginning in 1990, while Montana and the federal agencies were preparing a long-term plan, Montana needed an interim management plan to protect private property, provide for human safety, and protect the state's brucellosis class-free status. NPS complied with an environmental assessment (EA) that



provided for limited NPS management of bison through hazing, monitoring, and shooting outside of park boundaries at the request and under the authority of the Montana Department of Fish, Wildlife and Parks. In 1992, the state of Montana entered into an agreement with NPS, the U.S. Department of Agriculture (USDA) Forest Service (USFS) and the USDA Animal Protection Health Inspection Service (APHIS) to develop a long-term management plan and environmental impact statement (EIS) for managing bison migrating from Yellowstone into Montana.

Lawsuit Filed

In January 1995, the state of Montana filed a lawsuit against NPS and APHIS because it believed the federal agencies were asking the state to implement conflicting management actions. NPS wanted more tolerance for bison on winter range outside the park; APHIS said if bison from an infected population ranged free in Montana, the state could lose its brucellosis class-free status. In the settlement, APHIS agreed to not downgrade Montana's status if bison migrated from Yellowstone into Montana as long as certain actions were taken, including completing a long-term bison management plan.

The Interim Management Plan

The 1996 interim plan called for NPS to build a bison capture facility inside Yellowstone National Park at Stephens Creek, near the northern boundary. All captured bison would be tested for brucellosis; seropositive animals would be shipped to slaughter. Any bison migrating north of the park into the Eagle Creek/Bear Creek area (east of the Yellowstone River) would be monitored and not captured. The Montana Department of Livestock (which, in 1995, had been given authority to manage bison in Montana) was to capture all bison migrating out of the park at West Yellowstone and test them for brucellosis. All seropositive bison and seronegative pregnant females would be sent to slaughter. Other seronegative bison were to be released on public land. At their discretion, Montana could shoot any untested bison in the West Yellowstone area that they could not capture.

This plan began during the winter of 1996–97, the most severe winter since the 1940s. Large numbers of bison migrated across the north and west boundaries. By the end of the winter, 1,084 bison had been shot or sent to slaughter. Public outcry was much stronger than in 1989.

Draft EIS Released

A draft long-term bison management plan and EIS was released in 1998. The alternatives ranged from capturing all bison leaving the park and sending those that test positive to slaughter, to the use of public hunting to control bison in Montana, to establishing tolerance zones for bison outside park boundaries.

The plan received more than 67,500 public comments, the majority favoring an alternative plan that emphasized protection of bison.

The Final EIS & Management Plan

During development of the final EIS, the lead agencies reached an impasse and in December 1999, the federal agencies withdrew from a Memorandum of Agreement with the state of Montana to jointly produce a long-term management plan. The state challenged this action and a federal judge upheld the federal agencies' withdrawal in February 2000. However, before formal dismissal of the lawsuit, the state and federal agencies agreed to work out their differences using a court-appointed mediator to help find common ground in managing the bison population. The agencies developed a modified preferred alternative that minimized the risk of brucellosis

2000

February: *A federal judge orders state and federal agencies into mediation to work out their differences.*
August: *Final EIS released and receives several thousand comments.*
December: *Records of Decision signed by federal and state governments.*

2002–2005

In years 2–5 of the Bison Management Plan, more than 200 bison are shipped to slaughter or killed each year.

2005

FWP & APHIS open quarantine facility; several dozen bison calves taken from Yellowstone for project.
DOL & APHIS begin vaccinating captured bison.
FWP begins bison hunt on November 15.

2006

893 bison shipped to slaughter or killed as of March 06.
87 calves enter quarantine facility.
45 bison killed in bison hunt, which ended February 15.

transmission from bison to cattle, systematically worked toward eradication of brucellosis in the bison herd, provided a mechanism to increase winter range for bison on public lands outside the park, and minimized the killing of bison that left the park.

In August 2000, the *Final Environmental Impact Statement for the Interagency Bison Management Plan for the State of Montana and Yellowstone National Park* was released. After a public comment period, the final management plan was refined in consultation with the state of Montana and is a slightly altered version of the federal agencies' modified preferred alternative presented in the FEIS. In December 2000, the federal government and the state of Montana released separate Records of Decision that describe the negotiated settlement.

The final management plan uses adaptive management and progressive steps to phase in greater tolerance for bison outside Yellowstone. Step One limits bison to the park and one management area outside the west boundary (for up to 100 seronegative bison). In the third phase of implementation, up to 100 untested bison would be tolerated in winter both outside the park boundary near Reese Creek and the west boundary. During all phases of the adaptive management strategy, one management area outside the north boundary—in the Eagle Creek/Bear Creek area—would allow unlimited number of bison. The Interagency Bison Management Plan allows managers to capture and remove all bison, regardless of disease status, outside the west boundary or near the north boundary if the late winter or early spring bison population estimate is above 3,000. Cattle will be vaccinated and monitored in specific areas near Yellowstone National Park. Methods for bison management may include additional monitoring of bison on public lands outside the park, hazing onto appropriate public lands or back into the park in the spring, and control on public lands outside the park through capture and slaughter or agency shooting. The plan also includes provisions for continued research to address uncertainties identified during the planning process.

The last public hearing on the draft EIS, in Minneapolis, MN, was preceded by a rally organized by area tribes.

Recent Developments

Understanding bison movement

Observations of bison movement during the first five years of the management plan have revealed patterns. In the west management zone, groups of ten or less adult male bison use this area from late September until early June. Groups of adult females move into this area in late winter and remain well into the birthing season. Groups of adult females move into the north management zones earlier and stop prior to birthing period. Up to 200 bison use the Eagle Creek/Bear Creek area each winter.

Winter 2005–2006

During August of 2005, close to 5,000 bison lived in the park. In response to winter weather conditions, hundreds of bison migrated to winter range along and outside

9

Bison Management

NPS objectives in the Final EIS and Bison Management Plan:

- *Maintain genetic integrity of the bison population.*
- *Maintain a wild, free-ranging bison population.*
- *Maintain and preserve the ecological function that bison provide in the Yellowstone area, such as their role as grassland grazers and as a source of food for carnivores.*
- *Lower brucellosis prevalence because it is not a native organism.*
- *Reduce risk of brucellosis transmission from bison to cattle.*

the park's north boundary. More than 800 bison were captured and shipped to slaughter. Also, more than 80 calves were sent to quarantine (see below). The loss of this many bison, in addition to those that died from predation, accidents, and the harsh weather conditions, will not prevent the long term conservation of the bison population.

Vaccination

The bison management plan includes a bison vaccination program. State and federal agencies have developed such programs to be used at boundary capture facilities. The National Park Service is undergoing an environmental study to evaluate vaccinating bison throughout the park in the field, using remote delivery methods that do not require handling individual bison. Because scientists now know more about bison movement patterns, group dynamics, and habitat distribution, they better understand where and when field vaccination could succeed.

Bison hunt

The state of Montana authorized a bison hunt on public lands outside Yellowstone National Park, which runs November 15 to February 15. Fifty permits were issued. Through the hunt, the state can manage bison on low elevation winter ranges within the state.

Quarantine

A bison quarantine feasibility study is being conducted outside the north boundary of Yellowstone National Park. A protocol is being tested to certify disease-free bison. If a successful protocol is developed, quarantine could provide a way for Yellowstone bison to be a part of bison conservation in other places.

Outlook

In September 2005, the partner agencies in the bison management plan completed a five-year review of management actions. The report noted success in keeping bison and cattle apart, which has protected both Yellowstone's bison population and Montana's brucellosis-free status. The agencies will continue to monitor bison abundance, distribution and movements, and brucellosis prevalence in the population. In addition, they will continue to advance the management program toward greater tolerance for bison on low elevation winter range outside Yellowstone. The federal Record of Decision is available at www.planning.nps.gov/document/yellbisonrod.pdf

Brucellosis Management in Greater Yellowstone

NPS participates in the Greater Yellowstone Interagency Brucellosis Committee (GYIBC), whose goal is to "protect and sustain the existing free-ranging elk and bison populations in the greater Yellowstone area and protect the public interests and economic viability of the livestock industry in Wyoming, Montana and Idaho." The mission of GYIBC is to develop and implement brucellosis management plans for elk and bison. Objectives include maintaining viable elk and bison populations; maintaining the brucellosis-free status of Wyoming, Montana, and Idaho; aggressively seeking public involvement in the decision making process; and planning for the elimination of Brucella abortus *from the Yellowstone area by the year 2010.*

An NPS–Natural Resources Preservation Program project began research and collection of data on bison ecology and how B. abortus *survives and functions in a wild environment. This project involved Grand Teton and Yellowstone national parks, and the information gathered from the research will help managers make sound defensible decisions for the future management of bison and elk in the two parks.*

NPS is also working with the Biological Resources Division of the U.S. Geological Survey in an ongoing research effort to examine the demographic characteristics from a previous study of bison in Yellowstone National Park. Preliminary results about bison movement in the park suggest that the animals do not travel on groomed roads as much as expected, but tend to follow rivers and other corridors.

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Issues: Grizzly & Black Bear Management

Early visitors to Yellowstone National Park developed an interest in the area's wildlife—especially the bears. Dumps as bear-viewing sites quickly became a primary tourist attraction. At the height of the bear-feeding era, hundreds of people sat nightly in bleachers and watched as bears fed on garbage.

Despite the official prohibition in 1902 against hand-feeding bears, Yellowstone National Park became known as the place to see and interact with bears. Roadside bears, often receiving handouts from enthusiastic park visitors, caused "bear jams"—a traffic jam resulting from the presence of one or more photogenic black bears, often with a park ranger standing by to direct traffic, answer questions, and even pose for pictures.

In 1931, as park visitation and the number of bear-human conflicts began to increase, park managers began keeping detailed records of bear-caused human injuries, property damages, and subsequent nuisance bear control actions. Between 1931 and 1969 an average of 48 bear-inflicted human injuries and more than 100 incidents of property damage occurred annually in Yellowstone.

In 1959 and continuing through 1971, Drs. John and Frank Craighead, who were brothers, conducted a pioneering ecological study of grizzly bears in Yellowstone. Their research provided the first scientific data about grizzlies in this ecosystem, which enabled park staff to manage bears based on science and solve the underlying causes leading to bear-human conflicts.

In 1960, the park implemented a bear management program—directed primarily at black bears—designed to reduce the number of bear-caused human injuries and property damages that occurred in the park and to re-establish bears in a natural state. It included expanded efforts to educate visitors about bear behavior and the proper way to store food, garbage, and other bear attractants; prompt removal of garbage to reduce its availability to bears, and the development and use of bear-proof garbage cans; stricter enforcement of regulations prohibiting the feeding of bears; and removal of potentially hazardous bears, habituated bears, and bears that damaged property in search of food.

After 10 years of this bear management program, the number of bear-caused human injuries decreased only slightly, to an average of 45 each year. Consequently, in 1970, Yellowstone initiated a more intensive bear management program that included the controversial decision to eliminate the unsanitary open-pit garbage dumps inside the park. The long-term goal was to wean bears off human foods and garbage and back to a natural diet of plant and animal foods available throughout the ecosystem.

Bear Management

Feeding Bears

- 1889: Bears gathered at night to feed on garbage behind park hotels.
- 1910: First incidents of bears seeking human food along park roads.
- 1916: First confirmed bear-caused human fatality.

Early Management

- 1931: Park began keeping detailed records of bear-inflicted human injuries, property damage, and bear control actions.
- 1931–1969: average of 48 bear-inflicted human injuries and more than 100 incidents of property damage occurred annually in Yellowstone.

Changes in Management

- 1970: Yellowstone implemented a new bear management program to restore bears to subsistence on natural foods and to reduce human injuries and property damage.
- Strict enforcement of regulations prohibiting the feeding of bears, and requiring proper storage of human food and garbage.
- All garbage cans in the park converted to a bear-proof design.
- Garbage dumps closed within and adjacent to the park.

Current Status

- In 1975, the grizzly bear population in the Yellowstone ecosystem was listed as a threatened species under the Endangered Species Act.
- Decrease in human injuries from 45 injuries per year in the 1960s to 1 injury per year in the 2000s.
- Decrease in property damage claims from 219 per year in the 1960s to an average of 7 per year in the 1990s.
- Decrease in number of bears that must be killed or removed from the park from 33 black bears and 4 grizzlies per year in the 1960s to an average of 0.2 black bear and 0.3 grizzly bear per year in the 1990s.
- Decrease in bear relocations away from the front country from more than 100 black bears and 50 grizzlies per year in the 1960s to an average of 0.4 black bear and 0.9 grizzly bear per year in the 1990s.

The Craigheads predicted bears would range more widely, resulting in more bear-human conflicts and subsequent bear mortalities. This indeed occurred in the short term. During the program's first three years, an average of 38 grizzly bears and 23 black bears were trapped each year and translocated from roadsides and developed areas to back-country areas. In addition, an average of 12 grizzly bears and 6 black bears were removed from the population each year. However, bear-caused human injuries decreased significantly to an average of 10 each year. After 1972, the number of bear-human conflicts and bear management control actions declined significantly.

In 1983, the park implemented a new grizzly bear management program. The 1983 program emphasized habitat protection in back-country areas. The park established "bear management areas" where recreational use was restricted in areas with seasonal concentrations of grizzly bears. The goals were to minimize bear-human interactions that might lead to habituation of bears to people, to prevent human-caused displacement of bears from prime food sources, and to decrease the risk of bear-caused human injury in areas with high levels of bear activity. This program continues today.

Listing As a Threatened Species

In 1975, the grizzly bear in the lower 48 states was listed as threatened under the Endangered Species Act, in part, because the species was reduced to only about two percent of its former range south of Canada. Five or six small populations were thought to remain, totaling 800 to 1,000 bears. The southernmost—and most isolated—of those populations was in greater Yellowstone, where 136 grizzly bears were thought to live in the mid-1970s.

The listing of the grizzly for protection under the Endangered Species Act resulted in cessation of grizzly bear hunting in the Greater Yellowstone Ecosystem, and the development of numerous plans and guidelines to protect the remaining bears and their habitat within an identified recovery area. The Yellowstone grizzly bear recovery area is approximately 9,500 square miles in size and includes all of Yellowstone National Park, the John D. Rockefeller, Jr. Memorial Parkway, significant portions of Grand Teton National Park and the Bridger-Teton, Shoshone, Gallatin, Caribou-Targhee, Custer, and Beaverhead-Deer Lodge national forests. It also includes Bureau of Land Management lands and state and private lands in Idaho, Montana, and Wyoming.

Research and management of grizzlies in greater Yellowstone intensified after the 1975 establishment of the Interagency Grizzly Bear Study Team (IGBST). The team, in cooperation with state wildlife managers in Idaho, Montana, and Wyoming, have monitored bears, estimated the number and trend of the population, and enhanced our understanding of grizzly bear food habits and behavior in relation to humans and to other wildlife species.

In 1983, the Interagency Grizzly Bear Committee (IGBC) was created in order to increase the communication and cooperative efforts among managers of grizzly bears in all recovery areas. Twice each year, managers meet to discuss common challenges related to grizzly bear recovery. They supervise the implementation of public education programs, sanitation initiatives, and research studies to benefit the grizzly bear populations in Yellowstone and the other recovery areas.

Scientists and managers believe that, despite the continuing growth in human use of greater Yellowstone, the grizzly population has been stable to slightly increasing since 1986. The bears seem to be reproducing well and raising cubs in nearly all portions of the recovery area. More and more frequently, bears have been seen well outside Yellowstone National Park, south into Wyoming's Wind River Range, north throughout the Gallatin Range, and east of the Absarokas onto the plains. By radio tracking, trapping, and aerial observation, we know bears are dispersing into new habitat. In 2004, scientists estimated 588 grizzly bears lived in the Greater Yellowstone Ecosystem.

9

Bear Management

On July 28, 1975, under the authority of the Endangered Species Act (ESA), the U.S. Fish and Wildlife Service listed the grizzly bear as a threatened species. A primary goal of the ESA is to recover threatened or endangered species to self-sustaining, viable populations that no longer need protection. To achieve this goal, federal and state agencies have developed and are implementing a Grizzly Bear Recovery Plan and a Conservation Strategy

The Grizzly Bear Recovery Plan

Parameter 1: Females with Cubs

Adult female grizzly bears with cubs-of-the-year (COY) are the most reliable segment of the population to count. Using aerial and ground observations, a minimum number of unduplicated females with cubs is recorded each year. Females are identified by the number of cubs and pelage color combinations of different family groups; some also wear radio collars.

Recovery Goal: Average 15 adult females with COY on a 6-year running average both inside the recovery zone and within a 10-mile area immediately surrounding the recovery zone.

Rationale: To estimate an average minimum population size and to demonstrate that a known minimum number of adult females are alive so that reproduction is sufficient to sustain existing levels of human-caused bear mortality in the ecosystem. A running 6-year average accounts for two breeding cycles and will allow at least two years when each live adult female can be reported with cubs. The 6-year average number of unduplicated females with cubs is intended to derive a minimum population estimate, not to determine precise population size or trend.

Current Status: Achieved: The annual average number of unduplicated females with COY (2000–2005, 6-year average) is 39.5.

The Issue

The grizzly bear is listed as a threatened species, which requires recovering the species to self-sustaining, viable population.

Background

1975: The grizzly bear is listed as a threatened species.
1993: A recovery plan is implemented with three specific recovery goals that have to be met for six straight years.
2000: A team of biologists and managers from the USFS, NPS, USFWS and the states of Idaho, Wyoming, and Montana complete the Draft Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem.
2000–2002: Public comment periods included meetings held in Montana, Wyoming, and Idaho; total number of comments: 16,794.
2002: The Conservation Strategy is approved.
2003: The recovery goals are met for the sixth year in a row.
2005: The USFWS proposes removing the grizzly bear from the list of threatened species.

Three Recovery Goals

1. Average 15 adult females with cubs of the year inside the recovery zone and within a 10-mile area surrounding the recovery zone.
2. Females with young occupy 16 of 18 recovery zones; no two adjacent areas shall be unoccupied.
3. Known human-caused mortality is below 4% of the population estimate based on the most recent three-year sum of females with cubs minus known, adult female deaths. In addition, no more than 30% of the known human-caused mortality shall be females. These mortality limits cannot be exceeded during any two consecutive years.

Conservation Strategy Highlights

1. Establishes population and habitat triggers that initiate a biological review of the species if the population or habitat fall below certain threshold levels.
2. Protect habitat.
3. Monitor changes in grizzly genetic diversity, major food sources, bear predation of livestock, private land development inside the recovery area, hunter-related bear deaths, and cub production, mortality, and distribution.

Current Status

The USFWS has proposed delisting the grizzly bear in the Greater Yellowstone Ecosystem. The public comment period ended in March 2006, but no decision has been announced as of March 2006.

Parameter 2: Distribution of Females with Cubs

Monitor grizzly bear population trends and analyze consequences of human activities and development on bears in 18 Bear Management Units (BMUs) within the recovery area. Most BMUs contain complete spring, summer, and fall habitat for grizzly bears.

Recovery Goal: To have 16 of 18 BMUs occupied by at least one female with young from a running 6-year sum of observations and no two adjacent BMUs unoccupied. Occupancy requires verified sightings or tracks of at least one female with young at least once in each of 16 BMUs during a 6-year period.

Rationale: Demonstrate an adequate distribution of reproductive females within the recovery zone. Adult female grizzlies have a strong affinity for their home range and their offspring, especially females, tend to occupy habitat within or near the home range of their mother after being weaned. This parameter assumes successful reproduction indicates sufficient habitat is available and is being managed adequately.

Current Status: Achieved: From 2000 through 2005 (6-year running sum), all 18 BMUs were occupied at least once with family groups.

Parameter 3: Mortality

The rate of human-caused grizzly bear mortality, especially of adult females, is a key factor in the potential recovery of the population in the Yellowstone ecosystem. Therefore, recovery cannot be achieved if mortality limits are exceeded during any two consecutive years.

Recovery Goals:

1: Known human-caused mortality is no more than 4 percent of the population estimate.
2: Females comprise no more than 30 percent of the known human-caused mortality.

Rationale: Grizzly bear populations probably can sustain 6 percent human-caused mortality without population decline, which is why the first mortality goal is set at no more than 4 percent of the minimum population estimate. The most recent 3-year sum of unduplicated females with cubs is used to calculate a minimum population estimate, applying the proportion of adult females in a population to the minimum number of adult females known to be alive. Mortality limits are recalculated annually based on population monitoring.

Current Status: Achieved. From 2000 through 2005 (6-year running sum), the annual average of known, human-caused grizzly bear deaths was 13.7 bears (14.5 allowed). During the same period, the average of known human-caused female mortality was 6.2 female bears per year, above the allowed 4.3 bears (30 percent of the total allowable of 17).

Status of Grizzly Recovery Goals

	94	95	96	97	98	99	00	01	02	03	04	05
Goal 1 Average of 15 adult females with COY for 6 years in and around the recovery zone.	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Goal 2 16 Bear Management Units occupied by females with young for 6 years.	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Goal 3 4% or less human-caused mortality; female bears comprise 30% or less of mortalities.	✔				✔	✔	✔	✔	✔	✔		

The Grizzly Conservation Strategy

The conservation strategy is the primary long-term guide for managing and monitoring the grizzly bear population and assuring sufficient habitat to maintain recovery. It emphasizes continued coordination and cooperative working relationships among management agencies, landowners, and the public to ensure public support, continue application of best scientific principles, and maintain effective actions to benefit the coexistence of grizzlies and humans in the ecosystem. It incorporates existing laws, regulations, policies, and goals such as those of the Grizzly Bear Recovery Plan.

Flexibility in the Strategy

- Grizzly/human conflict management and bear habitat management are high priorities in the recovery zone, which is known as the Primary Conservation Area (PCA). Bears are favored when grizzly habitat and other land uses are incompatible; grizzly bears are actively discouraged and controlled in developed areas.
- State wildlife agencies have primary responsibility to manage grizzly bears outside of national parks, including bears on national forests; national parks manage bears and habitat within their jurisdictions.
- The goal to sustain a grizzly bear population at or above 500 bears includes the entire Greater Yellowstone Ecosystem.
- State and federal wildlife managers will continue to monitor the grizzly population and habitat conditions using the most feasible and accepted techniques, including the maintenance of a radio-collared sample of bears and scientific methods to assess habitat conditions and changes on a broad geographic scale.
- Removing nuisance bears will be conservative and consistent with mortality limits outlined above, and with minimal removal of females. Managers will emphasize removing the human cause of conflict rather than removal of a bear.
- Managers have more flexibility to manage nuisance grizzlies, particularly male bears. Bears may be relocated as many times as judged prudent by managers.
- Management areas, previously used to delineate differences in land-management strategies, are eliminated. Decisions affecting grizzly bears and/or their habitat will be based on existing and future management plans incorporating input from biologists, other professional land managers, and affected publics.
- Outside the PCA, state management plans define where grizzly bear occupancy are acceptable. These decisions will be made with input from affected groups and individuals.
- Managers will periodically share information, implement coordinated management actions, ensure data collection, and identify research and financial needs across state and federal jurisdictions.

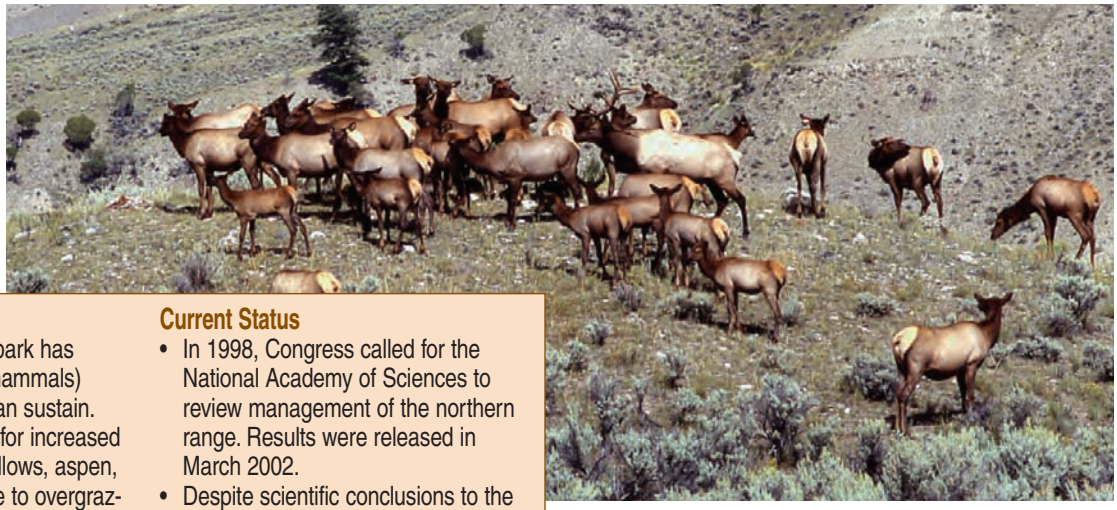
What Is Next

Completion of a conservation strategy does not in itself propose or accomplish a change in status of the grizzly bear population. The conservation strategy is a commitment by the responsible agencies to long-term management of grizzly bears and their habitat in ways that are compatible with human occupation and enjoyment of greater Yellowstone.

In 2005, the U.S. Fish and Wildlife Service (FWS) proposed delisting the Yellowstone grizzly population. If delisting is approved, long-term recovery goals will continue to be monitored. When conditions deviate from these goals, a recommendation can be made for a formal status review by FWS to determine if the Yellowstone grizzly bear population needs to be relisted under the Endangered Species Act.

9

Issues: Northern Range



The Issue

Some people believe the park has more ungulates (hoofed mammals) than the northern range can sustain. Elk and bison are blamed for increased erosion and declines in willows, aspen, and beaver, ostensibly due to overgrazing. Other scientists have found no evidence that the park's grasslands are overgrazed.

History/Background

- For decades, the park intensively managed elk, bison, and pronghorn.
- The park discontinued wildlife reductions in 1968 to restore natural dynamics and minimize human intervention.
- In the 1970s and early 1980s, scientific and public concerns grew about the increasing population of ungulates on the northern range.
- In 1986, Congress mandated a major research initiative to answer these concerns. Results found that the northern range was healthy and that elk did not adversely affect the overall diversity of native animals and plants.

Current Status

- In 1998, Congress called for the National Academy of Sciences to review management of the northern range. Results were released in March 2002.
- Despite scientific conclusions to the contrary, some people continue to claim the northern range is overgrazed.
- In response to new controversy about the impact of wolves on the elk herds of the northern range, numerous researchers have been studying this elk population and the impact of wolf restoration.
- Some people are now concerned because elk counts have declined approximately 50% since 1994.

The northern range refers to the broad grassland that borders the Yellowstone and Lamar rivers in the northern quarter of the park *(map next page)*. This area sustains one of the largest and most diverse populations of free-roaming large animals seen anywhere on Earth. Many of the park's ungulates spend the winter here. Elevations are lower and the area receives less snow than elsewhere in the park. Often the ridge tops and south-facing hillsides here are clear of snow, a result of wind as well as snowmelt during the many sunny winter days. Animals take advantage of this lack of snow, finding easy access to forage.

History

The northern range has been the focus of one of the most productive, if sometimes bitter, dialogues on the management of a wildland ecosystem. For more than 80 years this debate focused on whether there were too many elk on the northern range. Although early censuses of the elk in the park, especially on the northern range, are highly questionable, scientists and managers in the early 1930s believed that grazing and drought in the early part of the century had reduced the range's carrying capacity and that twice as many elk were on the range in 1932 as in 1914. Due to these concerns about overgrazing and overbrowsing, park managers removed ungulates—including elk, bison, and pronghorn—from the northern range by shooting or trapping from 1935 to 1968. More than 26,000 elk were culled or shipped out of the park to control their numbers and to repopulate areas where over-harvesting or poaching had eliminated elk. Hunting outside the park removed another 45,000 elk during this period. These removals reduced the elk counts from approximately 12,000 to 4,000 animals.

As the result of public pressure and changing NPS conservation philosophy, YNP instituted a moratorium on elk removals in 1969 and has since let a combination of weather, predators, range conditions, and outside-the-park hunting and land uses influence elk abundance. Without any direct controls inside YNP, elk counts increased to approximately 12,000 elk by the mid-1970s, 16,000 elk by 1982, and 19,000 elk by 1988. This rapid population increase accentuated the debate

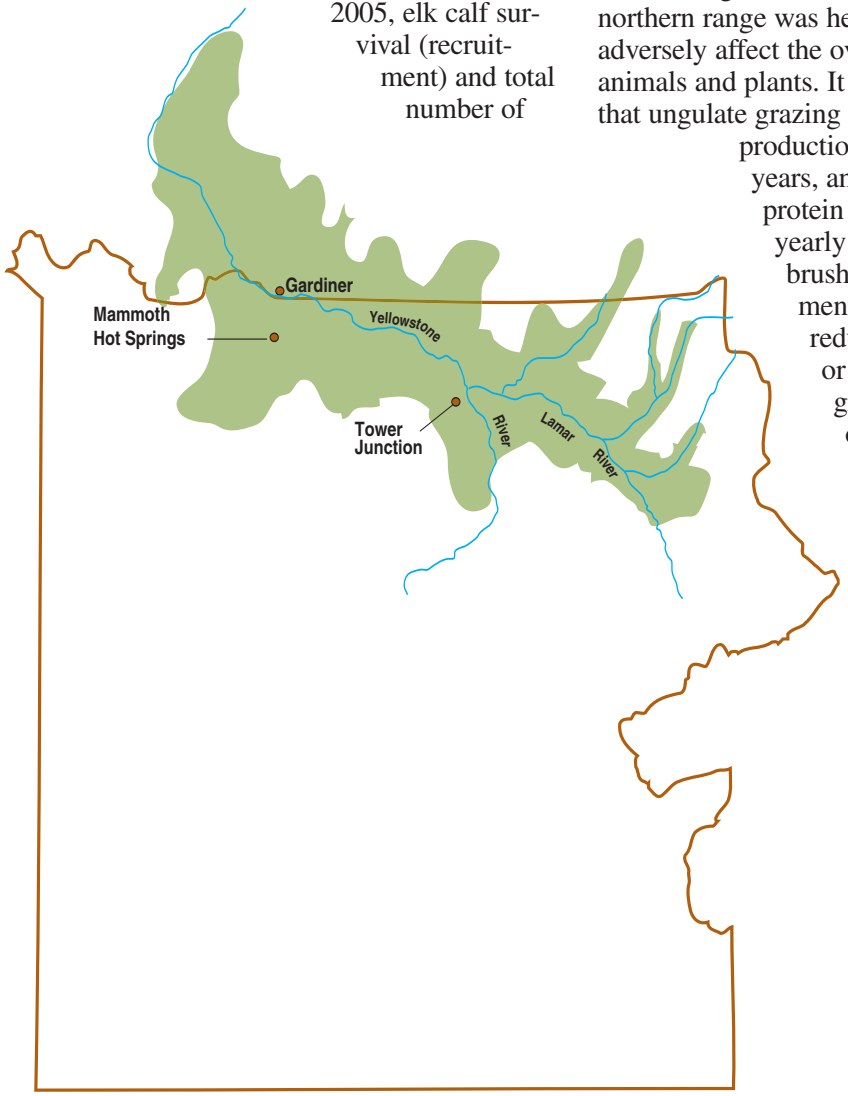
regarding elk grazing and its effects on the northern range.

The restoration of wolves into Yellowstone and their rapid increase changed the debate from concerns about "too many" elk to speculation about "too few" elk in the future because of wolf predation. Elk are the most abundant ungulates on the northern range and comprised more than 89 percent of documented wolf kills during winters from 1997 to 2005. These data cause some people to think wolves are killing off elk, despite the fact that elk continue to populate the northern range at relatively high density compared to areas outside the park.

Another set of statistics also alarm hunters, outfitters, and state legislators: From 2002 to 2005, elk calf survival (recruitment) and total number of the northern elk herd declined. Many factors (e.g. predators, drought, winterkill, hunting) contributed to the low recruitment and decreased elk numbers.

Research Results

Studies of the northern range began in the 1960s and have continued to the present. These studies reveal some overbrowsing of riparian plants, but no clear evidence of overgrazing. In 1986, continuing concern over the condition of the northern range prompted Congress to mandate more studies. This research initiative, one of the largest in the history of NPS, encompassed more than 40 projects by NPS biologists, university researchers, and scientists from other federal and state agencies. Results found that the northern range was healthy and elk did not adversely affect the overall diversity of native animals and plants. It was also determined that ungulate grazing actually enhances grass production in all but drought years, and grazing also enhances protein content of grasses, yearly growth of big sagebrush, and seedling establishment of sagebrush. No reductions in root biomass or increase in dead bunchgrass clumps were observed. However, studies on aspen and willows and their relationship to ungulates on the northern range are not so clear-cut and are continuing. Despite these results, the belief that elk grazing is damaging northern range vegetation and that grazing accelerates erosion persists among many people, including some scientists.



Yellowstone's northern range

Continuing Controversy

In 1998, Congress again intervened in the controversy, calling for the National Academy of Sciences to review management of the northern range. The results, published in *Ecological Dynamics on Yellowstone's Northern Range* (2002), concluded that "the best available scientific evidence does not indicate ungulate populations are irreversibly damaging the northern range." Studies investigating the responses of elk populations to wolf restoration continue.

Some sections of the northern range are fenced, as shown above, to study the long-term effects of grazing by fencing out large herbivores. The results were complex: Animals prune shrubs outside the fence but shrubs stay healthy. Apparently the herds are not destroying the unprotected vegetation.

In part, the controversy is likely due to the personal or scientific background of each person. Many urban dwellers live among intensively managed surroundings (community parks and personal gardens and lawns) and are not used to viewing wild, natural ecosystems. Livestock managers and range scientists tend to view the landscape in terms of maximizing the number of animals that a unit of land can sustain. Range science has developed techniques that allow intensive human manipulation of the landscape for this goal, which is often economically based. Many ecologists and wilderness managers, on the other hand, have come to believe that the ecological carrying capacity of a landscape is different from the concept of range or economic carrying capacity. They believe variability and change are the only constants in a naturally functioning wilderness ecosystem. What may look bad, in fact, may not be.

Change on the Northern Range

During the 1990s, the ecological carrying capacity of the northern range increased as elk colonized new winter ranges north of the park that had been set aside for this purpose. Summers were also wet while winters were generally mild. The fires of 1988 also had opened many forest canopies, allowing more grasses to grow.

Many scientists believe that winter is the major factor influencing elk populations. Mild winters allow many more elk to survive until spring, but severe winters result in significant levels of winter kill for many animals, not just elk. In severe winters (like the winter of 1988–89 or 1996–97), up to 25 percent of the herd can die. The northern Yellowstone elk herd demonstrates the ecological principle of density-dependence: over-winter mortality of calves, older females, and adult bulls all increase with higher elk population densities.

Elk are subject to predation by other species in the ecosystem, including bears, wolves, coyotes, and mountain lions. Also, the northern Yellowstone elk population is subject to four hunts each year. Elk that migrate out of the park may be legally hunted during an archery season, early season backcountry hunt, general autumn hunt, and the Gardiner late hunt, all of which are managed by the Montana Department of Fish, Wildlife and Parks. The primary objective of the Gardiner late hunt is to regulate the northern Yellowstone elk population that migrates outside the park during winter and limit depredation of crops on private lands. During 1996–2002, approximately 5–19 percent (mean ~11 percent) of the adult female portion of this population was harvested each year during the late hunt. However, antlerless harvest quotas have been reduced ninety-six percent in recent years due to decreased elk numbers.

The complex interdependence of these relationships results in fluctuations in the elk population—when there are lots of elk, predator numbers increase, which, in part, helps reduce elk numbers and recruitment.

National Park Service policies protect native species and the ecological processes that occur naturally across the landscape. Whenever possible, human intervention is discouraged. While controversy continues about the northern range and NPS management practices, many research projects continue in an effort to more accurately describe what is happening on Yellowstone's northern range.

See Chapter 2 for more about wolves affecting the ecosystem.

9

Issues: Sustainable Practices

In 1997, when Yellowstone National Park celebrated its 125th anniversary, one of the questions asked was what can we do to preserve and protect this national treasure for the next 125 years? The result was "The Greening of Yellowstone." Some "green" projects had already begun, such as demonstrating the cleanliness and efficiency of biodiesel fuel. Since that time the park and various partners have addressed a wide variety of pollution prevention, waste reduction, alternative fuels, and recycling projects. Together they have increased effective environmental conservation in the park and surrounding communities.

Greening of Yellowstone Workshop and Symposium

Yellowstone National Park partnered with the states of Montana and Wyoming, the U.S. Department of Energy (DOE), and private groups to host three-day symposia in October of 1996 and May of 1998. Participants developed a shared vision for sustainability of the park's values and providing ways to improve environmental quality. They considered a wide range of strategies such as developing a regional composting facility, operating alternatively fueled vehicles, replacing toxic solvents, using more environmentally-sound products, and modifying the energy infrastructure to make it more environmentally friendly. Participants ended the meetings with a commitment to work as partners in protecting and enhancing the region's unique environment.

Walking on Sustainability

Yellowstone has more than 15 miles of wood boardwalk, most of which are at least 20 years old. The wood for these boardwalks was pressure treated with chemicals for preservation. As the walkways deteriorate, toxic chemicals from the wood leach into the ground and water. As recycled plastic lumber replaces the pressure-treated wood, increasingly smaller quantities of toxic chemicals will be released in the park.

The Issue

Yellowstone is a leader in demonstrating and promoting sound environmental stewardship through regional and national partnerships.

History:

1995: Biodiesel truck donated to park to test alternative fuel.
1997: Park celebrates 125th anniversary and "greening" efforts increase.
1998: Old Faithful wood viewing platform replaced with recycled plastic lumber; employee Ride-Share Program begins.
1999: Yellowstone National Park begins using nontoxic cleaning & janitorial supplies; ethanol blended fuel offered to visitors.
2002: The Park's entire diesel fleet converts to biodiesel; the Greater Yellowstone/Teton Clean Cities Coalition receives federal designation.
2003: Regional composting facility opens; the park demonstrates the first fuel cell in a national park; the park begins testing prototype alternatively fueled multi-season vehicles.
2004: Park employees begin using four donated hybrid vehicles; Xanterra employee housing receives LEED designation.

Statistics

Annual recycling in the park:
newspapers, magazines, office paper: 207 tons
aluminum/steel: 102 tons
glass: 97 tons
plastic containers: 2 tons
cardboard: 150 tons

In addition, annually in Yellowstone:

- 300 vehicles use more than 167,000 gallons of biodiesel fuel
- 350 vehicles use more than 212,000 gallons of ethanol blended fuel

In 1998, Lever Brothers Company donated plastic lumber made from recycled plastic containers to replace the viewing platform around Old Faithful geyser. The equivalent of three million plastic milk jugs were used in this lumber. Now visitors receive an educational message about recycling while waiting for the world's most famous geyser eruption.

Driving Sustainability

Yellowstone National Park offers a unique opportunity to demonstrate alternative fuels in an environmentally sensitive and extremely cold area. To do so, the National Park Service partnered with the Montana Department of Environmental Quality (DEQ), DOE, and the University of Idaho to test a biodiesel fuel made from canola oil and ethanol from potato waste. In February 1995, Dodge Truck Inc. donated a new three-quarter ton 4x4 pickup to the project. The truck has been driven more than 180,000 miles on 100 percent biodiesel. It averages about 17 miles per gallon, the same as with petroleum-based diesel fuel.

Emissions tests showed reductions in smoke, hydrocarbons, nitrogen oxides, and carbon monoxide. Tests also showed bears were not attracted by the sweet odor of biodiesel exhaust, which had been a concern. In September 1998, the truck's engine was analyzed, revealing very little wear and no carbon build-up. Since that time, the park has begun using other alternative fuels and vegetable-based lube and hydraulic oils in many of its vehicles.

All diesel-powered vehicles used by park employees plus many used by concession operations use a 20 percent blend of canola oil and diesel. Gasoline-powered vehicles in the park use an ethanol blend (E-10). This fuel is also available to park visitors at service stations in the park—the first time this option has been available in any national park.

In 2004, the park began using hybrid vehicles, which operate with electricity generated by the gasoline engine and its braking system. These vehicles conserve gas, reduce emissions, and run quietly when using electricity. Toyota USA donated four Prius models, which help educate visitors about the environmental advantages of hybrid vehicles.

Building Sustainability

Yellowstone's buildings—many historic—present opportunities for incorporating sustainable building materials and techniques as they are maintained, remodeled, or replaced. To make the best use of these opportunities, the park and its partners have:

- drafted an architectural and landscape design standard based on national green building standards and Yellowstone Design Guidelines
- planned the new Old Faithful Visitor Education Center to meet LEED certification requirements (LEED—Leadership in Energy and Environmental Design—requires buildings to meet sustainable building standards. See above.)
- retrofitted several maintenance facilities with sustainable heating systems, insulation, and high-efficiency lighting
- encouraged concessioners to retrofit facilities and ask guests to conserve energy and water in the hotels and lodges

LEED Certification

The U.S. Green Building Council (USGBC), a building industry group, developed national standards for environmentally-sound buildings. Called LEED (Leadership in Energy and Environmental Design) Green Building Rating System®, these standards have been met in the Yellowstone Park area for an employee housing project completed in 2004. The National Park Service partnered with concessioner Xanterra Parks & Resorts to build two houses following LEED certification standards. The project earned LEED certification—the first in Montana, and the first single-family residence in the country. The features include:

- *Energy efficient design standards*
- *Passive solar gain*
- *State of the art heating/cooling systems list*
- *Landscaping with Yellowstone-produced compost*

"Green" Cleaning Products

In August 1998, the U.S. Environmental Protection Agency partnered with Yellowstone National Park to assess the park's cleaning products. They found existing products included some with slightly toxic ingredients and others with potentially significant health hazards. As a result, the park switched from more than 130 products with health or environmental risks to less than 10 products that are safe for the environment and employees. The assessment expanded to include park concessioners, who also switched to safer products. This switch to safer and more environmentally sound cleaning products has expanded into many other national parks.

Renewable Energy

Yellowstone managers have identified several facilities where alternative renewable energy sources are economical and efficient. One of the easiest to see is the solar electric array installed at the Lamar Buffalo Ranch. It provides more than 80% percent of the complex's energy needs. The Lewis Lake Contact Station and Ranger residence also use solar energy, reducing the use of a polluting propane generator

Even more efficient renewable electricity may come from fuel cells, which convert hydrogen into power and don't rely on sunny weather or battery storage. In 2002, park managers demonstrated this new technology will work in Yellowstone's extreme climate by using a fuel cell to provide electricity to the West Entrance Station.

Greening the new Old Faithful Visitor Education Center

The proposed Old Faithful Visitor Education Center (seen above in a computer-generated model) has been planned to showcase the park's commitment to environmental practices and sustainability. It will be built following standards set by the U.S. Green Building Council. The goal is to meet "Silver LEED Certification" (see previous page)—the first visitor center in the National Park System to do so.

Features include:

- *a design that reduces heated space in winter*
- *water-conserving fixtures*
- *public education of sustainable practices in the visitor center displays and programs*
- *unobtrusive, down-directed exterior lighting*

Recycling and Composting

In 1994, a study was done in Yellowstone National Park showing 60–75 percent of solid waste (the waste stream) could be composted. Large-scale composting becomes even more economical when compared to hauling the park's solid waste more than 150 miles to landfills.

The Southwest Montana Composting Project —a partnership among area counties, municipalities, and the National Park Service — built an industrial-grade composting facility near West Yellowstone. It began operating in July 2003 and will eventually transform 60 percent of park's solid waste into valuable soil conditioner.

Another regional partnership, The Headwaters Cooperative Recycling Project, which includes Yellowstone National Park, is expanding opportunities for recycling in the park and surrounding communities. For example, it has placed recycling bins for glass, plastic, paper, aluminum, and cardboard in the park's campgrounds and other visitor areas.

In 2005, Yellowstone became the first national park to recycle small propane cylinders, such as those used for lanterns and some camp stoves. In six months, the park collected more than 3,000 cylinders, which were crushed and redeemed as steel.

Employee Ride-Share Program

In January 1998, Yellowstone National Park initiated a Ride-Share Program at the suggestion of park employees living north of the park—many of whom live more than 50 miles away. They were willing to help finance the program. Benefits of the program include:

- reducing fuel consumption and air pollution
- improving safety by decreasing traffic
- easing parking constraints in the park
- saving employees money
- improving employee morale, recruitment, and retention

Approximately 45 employees participate in the Ride-Share Program, a significant demonstration of the National Park Service commitment to public transportation.

Clean Cities Coalition

The Clean Cities program is a DOE grassroots effort to address energy security and increase the use of alternative, cleaner fuels. The Greater Yellowstone/Teton Clean Cities Coalition comprises public and private stakeholders in Yellowstone and Grand Teton national parks and surrounding gateway communities in Idaho, Montana, and Wyoming.

To receive Clean Cities designation, the coalition had to agree on common goals and an action plan for reaching those goals. Although the national Clean Cities program focuses on

alternative fuels in vehicles, the coalition expanded its scope to include alternative fuel use in buildings and other operations. Their goals include:

- substantially reducing particulate matter entering the atmosphere
- educating and promoting the advancement of renewable fuels
- reducing dependency on fossil fuels
- setting the example for environmental stewardship

Upon receiving Clean Cities designation in 2002, the coalition became eligible for federal assistance to implement the various plans. Projects underway include:

- expanding the use of renewable fuels
- developing partnerships to foster sustainable efforts
- converting all stationary applications (heating boilers, generators.etc) to renewable fuels
- creating a tour district to promote a shuttle service within the Yellowstone region

Greening of Concessions

Yellowstone National Park's major concessioners contribute to environmental sustainability beyond the partnerships with the National Park Service described above. They also made a corporate commitment to an environmental management system (EMS) that meets international business standards for sustainability.

GreenPath and Delaware North

Delaware North, which operates the park's general stores, calls its EMS "GreenPath." Its goal is to reduce waste, increase recycling, and "make a positive environmental contribution to communities." Practices include:

- using nontoxic cleaning products
- stocking merchandise with recycled content, biodegradability, and minimal packaging

Employee "GreenTeams" at each location implement these practices and develop new ones.

Ecologix and Xanterra Parks & Resorts

Xanterra, which provides lodging in the park, calls its EMS "Ecologix." It includes employee participation to develop and implement sustainable practices such as the following:

- replaced more than 22,000 incandescent bulbs with efficient compact fluorescent lighting
- replaced two-stroke outboard engines for rental boats with cleaner burning and more efficient four-stroke engines
- recycle all used automotive batteries, antifreeze, and paint solvents
- purchase bleach-free paper products containing 100 percent post consumer content
- serve organic fair-trade coffee (pesticide-free, grown and harvested in a manner supporting wildlife and bird habitats, purchased from local farmers at a fair price)
- serve sustainable beef and pork (pigs and free-range cattle raised without hormones or antibiotics in humane facilities)

Even the menus and other printed items are produced sustainably. At Xanterra's print shop in Yellowstone, more than 4.1 million documents are printed annually. The ink is 100 percent soy-base and the paper contains post-consumer waste. To clean the presses, the employees use a solvent far less toxic than previous materials.

Outlook

Yellowstone National Park continues to develop partnerships in sustainable resources. For example, Yellowstone managers and their peers from concession companies, the Yellowstone Association, and regional partners have formed a working group to coordinate the waste management and resource development efforts. Partnerships such as this ensure Yellowstone and its partners remain leaders in testing and implementing sustainable environmental practices.

9

Issues: Wilderness

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is . . . an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain . . . an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural condition. . . .

The Wilderness Act of 1964

Yellowstone National Park has always managed its backcountry to protect natural and cultural resources and to provide park visitors the opportunity to enjoy a pristine environment within a setting of solitude. Yet none of the park is designated as federal wilderness under the Wilderness Act of 1964.

In 1972, in accordance with that law, Yellowstone National Park recommended 2,016,181 acres of Yellowstone's backcountry be designated as wilderness. Although Congress has not acted on this recommendation, these lands are managed so as not to preclude wilderness designation in the future. The last Yellowstone wilderness recommendation sent to Congress was for 2,032,721 acres.

Wilderness in the National Park System

Congress specifically included the National Park Service in the Wilderness Act and directed NPS to evaluate all its lands for suitability as wilderness. Lands evaluated and categorized as "designated," "recommended," "proposed," "suitable," or "study area" in the Wilderness Preservation System must be managed in such a way as 1) to not diminish their suitability as wilderness, and 2) apply the concepts of "minimum requirements" to all management decisions affecting those lands, regardless of the wilderness category.

Director's Order 41

Director's Order 41, issued in 1999, provides accountability, consistency, and continuity to the National Park Service's wilderness management program, and guides NPS efforts to meet the letter and spirit of the 1964 Wilderness Act. Instructions include:

- ". . . all categories of wilderness (designated, recommended, proposed, etc.) must be administered by NPS to protect wilderness resources and values, i.e., all areas must be managed as wilderness."
- "Park superintendents with wilderness resources will prepare and implement a wilderness management plan or equivalent integrated into an appropriate planning document. An environmental compliance document, in keeping with NEPA requirements, which provides the public with the opportunity to review and comment on the park's wilderness management program, will accompany the plan."

Minimum Requirement Analysis

The Intermountain Regional Director said "all management decisions affecting wilderness must be consistent with the minimum requirement concept." This concept allows managers to assess:

- if the proposed management action is appropriate or necessary for administering the area as wilderness and does not impact wilderness significantly

The Issue

In 1972, 90% of Yellowstone National Park was recommended for federal wilderness designation. Congress has not acted on this recommendation.

History

1964: Wilderness Act becomes law.

1972: National Park Service recommends 2,016,181 acres in Yellowstone as wilderness

1994: YNP writes a draft Backcountry Management Plan (BCMP) and environmental assessment, which is never signed. The BCMP begins to provide management guidance even though not official document.

1999: Director's Order 41 (DO 41) issued to guide NPS efforts to meet the letter and spirit of the 1964 Wilderness Act. It states that recommended wilderness must be administered to protect wilderness resources and values.

2003: NPS Intermountain Region implements a Minimum Requirement Policy to evaluate proposed management actions within proposed wilderness areas.

Backcountry Statistics

- Approximately 1,000 miles of trail.
- 72 trailheads within the park; 20 trailheads on the boundary.
- 301 designated backcountry campsites.
- Approximately 18% of backcountry users travel with boats and 7% travel with stock.
- During 2005: 16,970 overnight backcountry visitors spent an average of 2.3 nights in the wilderness.

Areas of Concern for Park Wilderness

- Accommodating established amount of visitor use.
- Protecting natural and cultural resources.
- Managing administrative and scientific use.
- Monitoring & implementing Limits of Acceptable Change [LAC].
- Educating users in Leave No Trace practices.

Current Status

Yellowstone's' natural resource staff is preparing a wilderness plan to manage wilderness within the park.

9

Wilderness

90% of the park is recommended for federally designated wilderness. Areas near roads, around major visitor areas, around backcountry ranger cabins, and in previously disturbed areas are not included.

- what techniques and type of equipment are needed to minimize wilderness impact.

Superintendents apply the minimum requirement concept to all administrative practices, proposed special uses, scientific activities, and equipment use in wilderness. They must consider potential disruption of wilderness character and resources before, and given significantly more weight than, economic efficiency and convenience. If wilderness resources or character impact is unavoidable, the only acceptable actions are those preserving wilderness character and/or having localized, short-term adverse impacts.

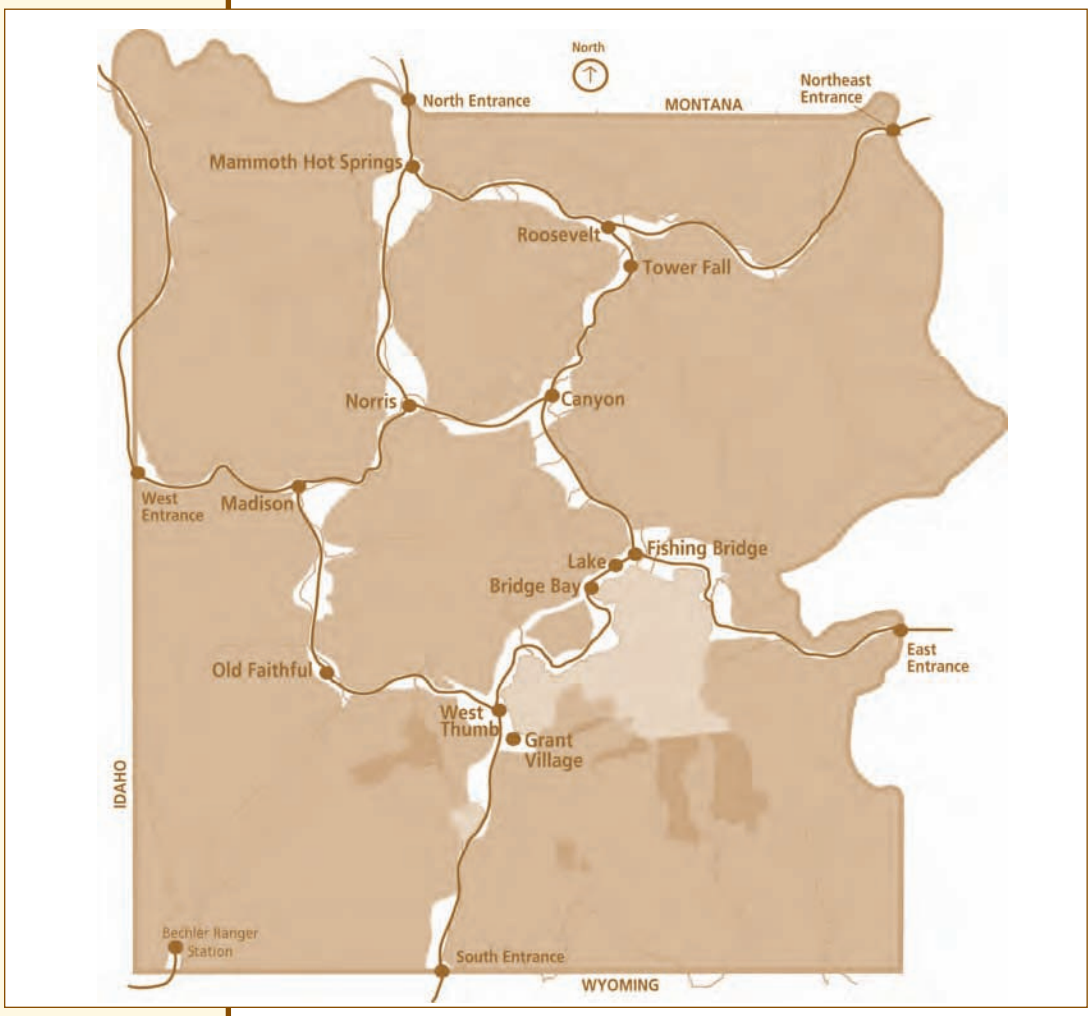
Wilderness Designation and Current Practices in Yellowstone

As managers develop a wilderness plan for Yellowstone, they must determine how current practices in the park will be handled within the proposed wilderness areas:

- Protecting natural and cultural resources while also maintaining the wilderness character of the park's backcountry.
- Managing administrative and scientific use to provide the greatest contribution with the minimum amount of intrusion in the wilderness.
- Monitoring Limits of Acceptable Change (LAC) to develop and enact long-range management strategies to better protect wilderness resources and enhance visitor experiences.
- Minimizing visitor wilderness recreation impact by educating users in Leave No Trace outdoor skills and ethics that promotes responsible outdoor recreation.

Outlook

Yellowstone will continue to manage its backcountry to protect park resources and provide a wilderness experience to park visitors. Park managers are developing a wilderness plan to best manage and preserve the wilderness character that Yellowstone's backcountry has to offer. Yellowstone will then wait for the time when Congress will act upon the recommendation to officially designate Yellowstone's wilderness.



9

Issues: Winter Use

Section revised & updated

Background

Winter use in Yellowstone has been the subject of debate for more than 75 years. At least twelve times since 1930, the National Park Service (NPS) and its interested observers and park users have formally debated what Yellowstone should look and be like in winter; undoubtedly, some form of debate continued between those 12 times.

Beginning in the early 1930s, communities around the park began asking NPS to plow Yellowstone's roads year-round so tourist travel and associated spending in their communities would be stimulated. Each time, NPS resisted, citing non-winterized buildings, harsh weather conditions, and roads too narrow for snow storage. Meanwhile, snowbound entrepreneurs in West Yellowstone began to experiment with motorized vehicles capable of traveling over snow-covered roads. In 1949, they drove the first motorized winter visitors into Yellowstone in snowplanes, which consisted of passenger cabs set on skis and blown about (without becoming airborne) with a rear-mounted airplane propeller and engine. In 1955, they began touring the park on Bombardier snowcoaches (then called snowmobiles), enclosed oversnow vehicles capable of carrying about ten people. Finally, in 1963 the first visitors on modern snowmobiles entered Yellowstone; not long after, snowmobiling became the predominant mode of touring the park in winter.

Still, pressure to plow park roads persisted, and Yellowstone authorities knew that they could not accommodate both snowmobiles

The Issue

We have debated what forms of use are appropriate in Yellowstone in winter for 75 years.

History: *See also timeline*

1949: First motorized oversnow visitors enter Yellowstone by snowplane.
1955: First use of snowcoaches (Bombardiers) in Yellowstone.
1963: First snowmobiles (six, total) entered the park.
1967: Congressional hearing held on plowing Yellowstone's roads year-round.
1968: Yellowstone managers decided, instead of plowing, to formalize their over-snow program.
1971: Managers begin grooming roads and Yellowstone Park Co. opened Old Faithful Snowlodge for first time.
1990: NPS issued *Winter Use Plan Environmental Assessment* for Yellowstone and Grand Teton National Parks.
1997: 1,084 bison killed upon leaving the park amid concerns about transmitting brucellosis to Montana cattle. Fund for Animals filed lawsuit; NPS signed agreement requiring development of a new winter use plan and environmental impact statement (EIS).
1999: Draft EIS released, received more than 48,000 public comments.
2000: The final EIS released, received about 11,000 public comments; record of decision (ROD) signed.
2000: December: The International Snowmobile Manufacturers Association (ISMA), et al. files suit challenging the proposed ban.
2001: January: The final rule published in the Federal Register; would ban snowmobiles from Yellowstone and Grand Teton in the winter of 2003–04.
2001: June: Settlement agreement reached with ISMA; NPS agrees to prepare a supplemental environmental impact statement (SEIS).
2002: spring: draft SEIS released; more than 350,000 comments received.
2003: Final SEIS and ROD signed, and on December 11, final rule published in *Federal Register;* allowed 950 Best Available Technology, guided snowmobiles daily.
2003: December 16: Judge Sullivan remands 2003 (SEIS) decision and directs NPS to begin phasing out recreational snowmobile use in Yellowstone.
2004: February 10: Judge Brimmer issues preliminary injunction against 2001 Final Rule (first EIS) banning snowmobiles. In October, he invalidated that rule.
2004: NPS completed EA for Temporary Winter Use Plans for Yellowstone & Grand Teton national parks; 95,000 comments received.
2005: NPS began preparation of third EIS on winter use; 33,000 scoping comments received.

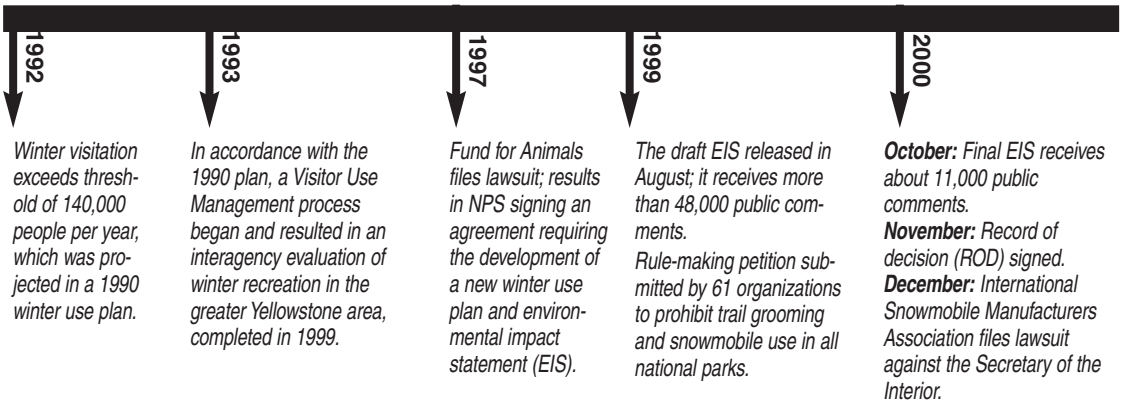
Current Status: *See also p. 173*

Under a three-year plan in effect through 2006-2007, limited numbers of snow-mobiles with professional guides can enter Yellowstone during the winter season.

Winter Use Goals

- Provide a high quality, safe and educational winter experience for visitors.
- Provide for visitor and employee health and safety.
- Preserve pristine air quality.
- Preserve natural soundscapes.
- Mitigate impacts to wildlife.
- Minimize adverse economic impacts to gateway communities.

Updates: http://www.nps.gov/yell/planvisit/winteruse/index.htm



and automobiles. The matter culminated in a congressional hearing in Jackson, Wyoming, in 1967. By this time, Yellowstone's managers realized that if they plowed, the look and feel of the park's winter wilderness would be dramatically altered. Snowmobiles offered them a way to accommodate visitor use while preserving a park-like atmosphere. Consequently, managers chose to formalize their oversnow vehicle program, believing it would preserve park resources better than plowing. In 1971, they began grooming snowmobile routes to provide smoother, more comfortable touring, and also opened Old Faithful Snowlodge, so that visitors could stay overnight at the famous geyser.

Throughout the 1970s, 80s, and early 90s, visitation by snowmobile grew consistently (some visitors continued to take snowcoaches into the park, but not until recently did snowcoach use substantially grow). This growth brought unanticipated problems, especially air and noise pollution, conflicts with other users, and wildlife harassment.

In 1990, recognizing that in solving one problem, others were developing, park managers completed the *Winter Use Plan Environmental Assessment* for Yellowstone and Grand Teton national parks and the John D. Rockefeller, Jr. Memorial Parkway. This plan formalized the park's existing winter use program and included a commitment to examine the issue further if winter visitation exceeded certain thresholds.

In the winter of 1992–1993, winter use exceeded the projection for the year 2000 (143,000 visitors), and shortly thereafter the Continental Divide Snowmobile Trail opened through Grand Teton National Park. According to the 1990 plan, then, NPS began a Visitor Use Management analysis, which included all types of winter recreation on all NPS and U.S. Forest Service (USFS) lands in the greater Yellowstone area. Park and forest staff utilized scientific studies, visitor surveys, and public comments to analyze the issues or problems with winter use. The final report, *Winter Use Management: A Multi-Agency Assessment,* published in 1999, made many recommendations to park and forest managers and summarized the state of knowledge regarding winter use at that time.

A Lawsuit and the First Environmental Impact Statement

During the severe winter of 1996–97, more than 1,000 bison left the park and were shot or shipped to slaughter amid concerns they could transmit brucellosis to cattle in Montana. Concerned that groomed roads increased the number of bison leaving the park and being killed, the Fund for Animals and other stakeholders filed suit in Washington, D.C. Federal District Court against NPS in May 1997. The lawsuit listed three primary complaints:

- NPS had failed to prepare an environmental impact statement concerning winter use in Yellowstone and Grand Teton national parks and the Rockefeller Parkway.
- NPS had failed to consult with the U.S. Fish and Wildlife Service on the effects of winter use on threatened and endangered species.
- NPS had failed to evaluate the effects of road grooming in the parks on wildlife and other park resources.

In October 1997, all parties signed an agreement to settle the lawsuit; mainly, NPS would prepare a new winter use plan and corresponding environmental impact statement (EIS), and would consult with the U.S. Fish and Wildlife Service on the effects of winter use on threatened and endangered species.

Park planners began preparing the EIS and associated winter use plan in early 1998. Besides addressing the concerns of the lawsuit, the plan had several overarching goals, which have remained the same throughout all subsequent winter planning efforts and are listed in the sidebar on page 169.

2001

January: *Final rule published in Federal Register.*
June: *Settlement agreement reached; NPS prepares supplemental EIS (SEIS).*
December: *Park begins program to reduce impacts of snowmobiles and to educate snowmobilers.*

2002

February: *Draft SEIS released. More than 350,000 comments received.*
November: *The Department of the Interior publishes rule to delay existing rule (from Jan. 01) by one year.*

2003

March: *Record of Decision signed.*
December 11: *Final rule published in Federal Register.*
December 16: *Federal judge directs YNP to begin phasing out snowmobiles.*

2004

February 10: *Another federal judge stops snowmobile phase-out; requires temporary rules for rest of winter.*
August: *EA released for three-year snowmobile plan following judge's guidelines.*
November: *Plan approved.*
December 15: *Winter season begins.*

2005

Second winter season begins under the three-year plan.
NPS begins working on 3rd EIS addressing winter use.

In August 1999, NPS released a draft EIS for public comment. The alternatives addressed the issues of visitor access, sound, emissions, wildlife concerns, and affordability. The preferred alternative called for, among other things, plowing the road from West Yellowstone to Old Faithful and allowing snowmobiles on other park roads (because the plowed road would not connect with other roads, plowing would not have altered park character substantially). The agency received more than 48,000 public comments that were fairly evenly split between those favoring snowcoach-only access and those desiring continued snowmobile use. Relatively few people favored plowing.

Separately, in January 1999, the Bluewater Network (a national conservation group) and 60 other associated organizations petitioned the Department of the Interior (DOI) to prohibit snowmobile trail grooming and use in all national park units. DOI did not formally respond to Bluewater Network, although in April 2000, DOI and NPS announced an intention to better implement the general snowmobile regulations and better comply with the laws and executive orders on off-road vehicle use on federal lands. The Network's petition helped to transform the winter use issue from a regional controversy into a national one.

In February 2004, at the direction of Judge Emmet Sullivan in Washington (see "A Winter of Critical Judicial Decisions," page 171), DOI responded to the Bluewater Network's petition, stating a complete ban on snowmobiles throughout the park system was unnecessary. The memo said, "We continue to believe that each park presents a unique set of environmental conditions and uses and, as such, would be better served through individual analysis and rulemaking as to snowmobile management."

Returning to its EIS effort, NPS invited nine regional governmental agencies to be "cooperating agencies," which provide technical input to the EIS writers. The nine were the three local states (Idaho, Montana, and Wyoming), the five local counties (Gallatin and Park in Montana; Park and Teton in Wyoming; and Fremont County, Idaho), and the U.S. Forest Service. At a meeting with them in March 2000, NPS announced a new direction for the preferred alternative: using snowcoaches as the only mechanized access to the interior of Yellowstone. In part, NPS

Concerns Raised at Public Meetings

overcrowding
visitor impacts on natural resources
noise & air pollution
availability of facilities and services
use restrictions
user group conflicts
importance of winter visitation to the local and regional economy
wildlife use of groomed surfaces
wildlife displacement
health & human safety

made this decision because the Environmental Protection Agency (EPA) designated it as the "environmentally preferred alternative" based on impacts to human health, air quality, water quality, and visibility; as well, NPS was responding to public opinion.

NPS released the final EIS proposing to ban snowmobiles and convert to snowcoach-only travel in October 2000. Attempting to fully engage the public, NPS accepted another 11,000 public comments, even though the Council on Environmental Quality (which oversees EIS development) does not require public review of a final EIS. The record of decision (ROD) was signed on November 22. These two steps (a final EIS and a ROD) are generally the first of three steps required for a federal agency to implement a major new policy. The third, publication of final regulations in the *Federal Register* (the publication used to advise Americans of new rules and decisions), occurred on January 22, 2001 (with another 5,200 public comments received). The new rules banned snowmobiles in the 2003–04 winter season, allowed for oversnow motorized recreational access by NPS-managed snowcoaches, and phased in these rules with reduced snowmobile numbers in the winter of 2002–03.

Significantly, the Record of Decision determined that past snowmobile use in the parks impaired the wildlife, air, soundscape, and certain recreational resources of the three parks. As such, snowmobile use violated the National Park Service Organic Act of 1916.

A Second Lawsuit and a Supplemental EIS

On December 6, 2000, the International Snowmobile Manufacturers Association (ISMA, an industry trade group) and the State of Wyoming filed lawsuits in the U.S. District Court for the District of Wyoming against NPS challenging the validity of the decision to phase out snowmobiles. Meanwhile, NPS began implementing the winter use plan (from the recently-completed EIS), allowing existing snowcoach and snowmobile outfitters to add snowcoaches to their fleet, and allowing 11 new outfitters to provide snowcoach tours. NPS also partnered with the U.S. Department of Energy's Idaho National Engineering and Environmental Laboratory (INEEL) to develop a snowcoach addressing the deficiencies of snowcoaches (unreliability, slow speeds, and cramped traveler conditions). The new vehicle would be multi-season, multi-passenger, multi-fueled, and fully accessible, and a prototype premiered in 2003 as the "New Yellow Bus." Also, Yellowstone National Park began working with its partners to develop a marketing strategy for visiting Yellowstone by snowcoach.

In June 2001, the parties to the suit reached a settlement agreement, requiring NPS to prepare a Supplemental EIS (SEIS). The purpose of the SEIS was to consider new snowmobile technologies and solicit additional public involvement. Cooperating agencies involved in the EIS again participated in the development of the SEIS, with the addition of the EPA. The SEIS looked at a wide range of ideas for managing winter use in the parks and reviewed new data, including emissions information from industry and from NPS and state-sponsored studies. This work did not contradict the findings of impairment of park resources and values from past snowmobile use as found in the 2000 Record of Decision. Rather, it pointed NPS toward new solutions to those problems. NPS received nearly 360,000 public comments (many of them form letters). Although approximately 80% of these comments were opposed to continued snowmobile use in the parks, federal managers addressed the common concerns about snowmobile effects on wildlife, soundscapes, air quality, and visitor experience.

Park concessioners and NPS are testing new multi-season vehicles, such as this bus tested in 2004.

Park planners soon found they needed more time to analyze the voluminous public comment. Consequently, NPS published a rule (the "Delay Rule") on November 18, 2002, which delayed the phase-out of snowmobiles by one year, to the winter of 2003–04. This detail would become more important than it might seem on the surface.

NPS released the final SEIS in February 2003, and the ROD was signed in March (the final rule on this decision would wait until December 2003). The SEIS goals remained the same as those in the original EIS. The Preferred Alternative was a package with several interrelated components, which were:

- To reduce air and noise pollution, all snowmobiles entering Yellowstone would be Best Available Technology (BAT), which used four-stroke engines to reduce hydrocarbon emissions 90 percent and carbon monoxide emissions 70 percent, compared to a standard two-stroke snowmobile. The same technologies reduced sound emissions to 73 decibels or below, when measured at full throttle.
- To address concerns about wildlife and safety, all snowmobilers in Yellowstone would be accompanied by an NPS-approved guide. Eighty percent of those would be commercial guides; 20 percent would be non-commercial group leaders who had attended a detailed training and orientation program).
- No more than 950 snowmobiles per day would be allowed into Yellowstone, with an additional 140 in Grand Teton National Park (such numerical restrictions would also help address noise and air pollution and wildlife concerns).
- NPS would implement a comprehensive monitoring and adaptive management program to assess the short- and long-term effects of management actions on park resources and values. Adjustments would be made in the management of the parks as a result of the monitoring.
- NPS would continue to develop a new generation of snowcoaches as a key to winter transportation, and 15 miles of side roads were designated snowcoach only.

A Winter of Critical Judicial Decisions

Upset over the proposed return to snowmobiling, the Fund for Animals and the Greater Yellowstone Coalition (GYC) both quickly filed suits contesting the SEIS and its new direction for winter use. The Fund for Animals lawsuit argued road grooming in Yellowstone had adversely affected bison distribution, abundance, and ecology, and called for an end to all road grooming, with the exception of the road from the South Entrance to Old Faithful, where few bison are located. GYC alleged (among other things) the change in snowmobile policy was unnecessary and snowmobile impacts were inconsistent with the mission of Yellowstone. Because the lawsuits had points in common, they were considered jointly by Judge Sullivan of the U.S. District Court in Washington, D.C. (the same court where the 1997 suit was filed).

While these lawsuits were under consideration, NPS proceeded with implementing the winter use plan. For example, the agency worked with Xanterra (Yellowstone's primary concessioner) to establish a new entrance reservation system for non-commercial snowmobiles to ensure that the 950 daily limit would not be exceeded.

On December 11, 2003, NPS published the final rule implementing the SEIS in the Federal Register. Five days later—just 13 hours before the park was to open under the newly approved rule—the D.C. District Court discarded that rule. Judge Sullivan ruled in favor of GYC, writing that the March 2003 decision allowing snowmobiling to continue was "arbitrary and capricious," a violation of the Administrative Procedures Act (APA) because it was a reversal of policy that needed extra justification; that the SEIS violated the National Environmental Policy Act (NEPA)

During the 2003–2004 winter season, two different judges struck down two different NPS decisions, because both violated the same two laws.

by not including a full range of alternatives (specifically one permitting no road grooming); and that NPS did not adequately explain why grooming did or did not affect bison populations. Because his decision was rendered when the delay rule was to take effect, Judge Sullivan directed Yellowstone National Park to begin the snowmobile phase-out as stipulated in the delay rule. Consequently, park authorities began the winter allowing only commercially-guided snowmobiles in the park with 11 or fewer machines, and no more than 493 snowmobiles per day could enter Yellowstone. Also, the new reservation system was abandoned.

Anticipating an unfavorable ruling from Judge Sullivan, ISMA and the State of Wyoming moved in December 2003 to reopen their original (2000) lawsuit in Wyoming District Court, again contesting the snowmobile phase-out. On February 10, 2004, Judge Clarence Brimmer of the Wyoming court ruled in favor of ISMA and Wyoming, issuing a preliminary injunction barring NPS from implementing the snowmobile phase-out. That October, he finalized his decision, writing that NPS violated the same two laws that Judge Sullivan said NPS had violated: the APA and NEPA. He said NPS had failed to fully analyze the snowcoach-only alternative (violating NEPA); failed to adequately involve the public (violating NEPA); and did not provide adequate justification for a reversal of several decades of snowmobile access (violating the APA).

Because Brimmer's February injunction came

Legal Framework for Snowmobiles in National Parks

National Park Service Organic Act of 1916: To conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same and by such means as will leave them unimpaired for the enjoyment of future generations.

NPS Management Policies—2001: Impairment is an impact that, in the professional judgement of the responsible NPS manager, would harm the integrity of the park resources or values, including the opportunities that would otherwise be present for the enjoyment of those resources and values.

General Authorities Act—1978: The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided for by Congress.

National Parks and Recreation Act—1978: Directs that management plans be prepared for all units of the National Park System that include, but are not limited to: (3) identification of and implementation commitments for visitor carrying capacities for all areas of the unit.

Clean Air Act: Section 160 states one of the purposes of the act is "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value."

Section 162 mandates the designation of national park areas greater than 6,000 acres and wilderness areas greater than 5,000 acres as Class I. Yellowstone and Grand Teton national parks are mandatory Class I areas.

Section 169(A) states that "Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing impairment of visibility in mandatory Class I Federal areas which impairment results from any manmade air pollution."

E.O. 11644—2/8/72 (President Nixon) "Use of Off-Road Vehicles on the Public Lands": Areas and trails shall be located in areas of the National Park System only if the respective agency head determines that off-road vehicle use in such locations will not adversely affect their natural, esthetic or scenic values.

E.O. 11989—5/24/77 (President Carter): The respective agency head shall, whenever he determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of the particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrences.

Departmental Implementation of Executive Order 11644, as amended by E.O. 11989, pertaining to use of off-road vehicles on the public lands (DOI prepared EIS, 1976): Clearly defines use of snowmobiles on roads as off-road vehicles.

36 CFR 2.18: The use of snowmobiles is prohibited, except where designated and only when their use is consistent with the park's natural, cultural, scenic, and esthetic values, safety considerations, park management objectives, and will not disturb wildlife and damage park resources.

in the middle of Yellowstone's winter season, he further ordered NPS to issue temporary regulations for the rest of the 2003–2004 season that were "fair and equitable to all parties." Consequently, Yellowstone and Grand Teton authorities scrambled again to come up with winter rules. This time, they used the authority in 36 CFR 1.5 (known as the "superintendent's compendium") to allow continued, managed snowmobile use in the parks. These temporary rules allowed 780 snowmobiles per day in Yellowstone and 140 per day in Grand Teton for the remainder of that season. All additional snowmobiles beyond the 493 already permitted daily would have to be BAT machines and commercially guided.

By the end of that winter, then, two different judges had struck down two different NPS decisions, because both violated the same two laws. In both cases, the winning plaintiffs were interested stakeholders feeling disenfranchised from decisions they arguably viewed as extreme, and all chose courts they believed would be sympathetic to their cause.

The Temporary Plan

Because it had no clear rules under which to operate Yellowstone for the 2004–05 winter season, NPS wrote the *Temporary Winter Use Plans Environmental Assessment* in 2004. The EA reflected the experience gained between 1998 and 2004. For example, requiring all visitors to use approved, commercial guides best protected park resources while offering visitors a quality winter experience. As evidence, law enforcement incidents were well below historic numbers for the winter of 2003–04, even after accounting for reduced visitation.

The temporary plan was approved in November 2004 with a "Finding of No Significant Impact" (FONSI) and a Final Rule published in the *Federal Register,* and implemented with the 2004–2005 winter season (EAs have fewer decision-making steps, not requiring RODs). Its provisions include:

- 720 snowmobiles are allowed to enter the park each day.
- All snowmobiles must be commercially guided.
- All recreational snowmobiles entering Yellowstone must meet BAT standards for reducing noise and air pollution.

This temporary winter use management plan is a balanced approach ensuring park resources are protected, providing visitors access to the parks, and giving visitors, employees, and residents of the park's gateway communities the information they need to plan for the next few years. The plan is in effect through the 2006–07 winter season. If a new plan is not approved, both snowmobile and snowcoach use will phase out.

Outlook

Various lawsuits were filed contesting the EA decision and some are still being considered. In October 2005, Judge Brimmer ruled on the most visible such lawsuit, from the State of Wyoming and the Wyoming Lodging and Restaurant Association against NPS contesting the temporary winter use plan. Brimmer ruled in favor of NPS, but retained jurisdiction over future NPS winter use decisions. Other court proceedings will continue and their result is unpredictable.

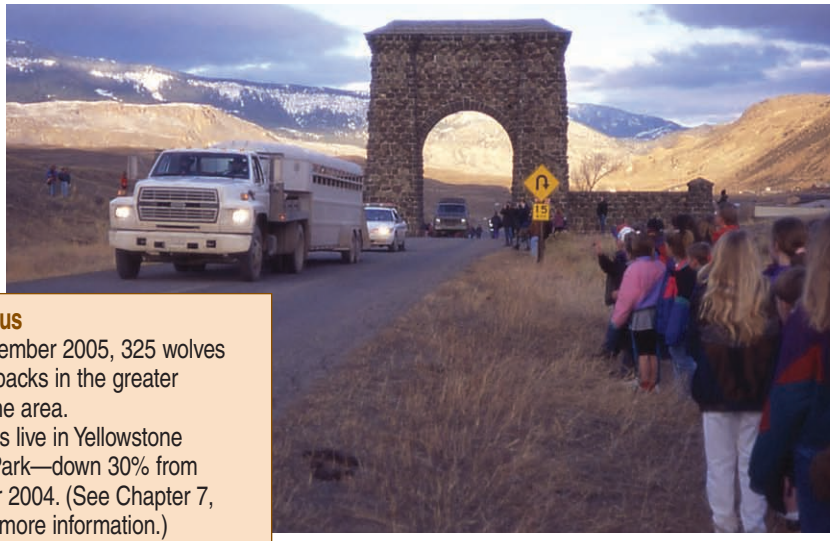
Separately, the U.S. Congress passed appropriations bills including language requiring the temporary winter use rules be followed in both fiscal years 2005 and 2006. Such laws superseded legal actions and provided certainty to all interested stakeholders regarding the upcoming winters.

Meanwhile, the park's scientists continue to monitor winter use. This information will be used to develop a new EIS that will result in new regulations for winter use for Yellowstone and Grand Teton national parks and the John D. Rockefeller, Jr. Memorial Parkway. In drafting the EIS, the park is continuing to work with its neighbors and partners—including concessioners, snowmobile and snowcoach guides and outfitters, chambers of commerce, businesses, the conservation community, and state tourism organizations. Park planners expect that regulations will be issued prior to the start of the 2007–08 winter season.

A historic turnabout in winter use has occurred in Yellowstone National Park. Rather than the essentially unmanaged situation of 40 years, the last two winters have seen the implementation of a well-managed, enjoyable winter use program. Yellowstone and Grand Teton national parks and the John D. Rockefeller, Jr. Memorial Parkway remain open for winter visitation, and are great places to visit.

9

Issues: Wolf Restoration



Welcoming the wolves on January 12, 1995

The Issue

The wolf is a major predator that had been missing from the Greater Yellowstone Ecosystem for decades until its restoration in 1995.

History

Late 1800s–early 1900s: predators, including wolves, were routinely killed in Yellowstone.

1926: The last wolf pack in Yellowstone was killed, although reports of single wolves continued.

1974: The gray wolf was listed as endangered; recovery is mandated under the Endangered Species Act.

1975: The long process leading to wolf restoration in Yellowstone began.

1991: Congress appropriated money for an EIS for wolf recovery.

1994: EIS completed for wolf reintroduction in Yellowstone and central Idaho. More than 160,000 public comments were received—the largest number of public comments on any federal proposal.

1995 and 1996: 31 gray wolves from western Canada were relocated to Yellowstone.

1997: U.S. District Court judge ordered the removal of the reintroduced wolves in Yellowstone, but stayed his order, pending appeal.

2000: January, the decision was reversed.

Current Status

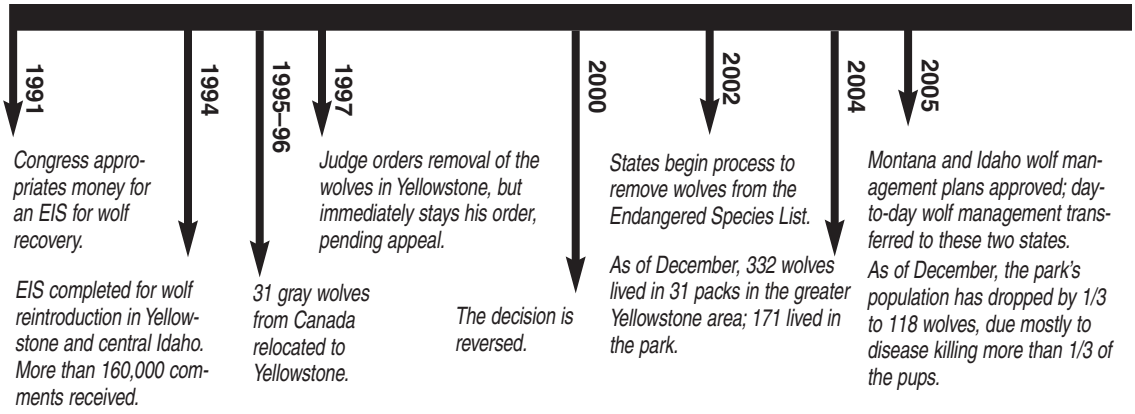
- As of December 2005, 325 wolves live in 45 packs in the greater Yellowstone area.
- 118 wolves live in Yellowstone National Park—down 30% from December 2004. (See Chapter 7, "Wolf," for more information.)
- 140 documented wolf deaths have occurred since the beginning of reintroduction. More than half the mortalities are human caused with the rest being natural. The leading natural cause of mortality is wolves killing other wolves.
- Livestock predation was expected to be 40–50 sheep and 10–12 cows per year, but has been much lower: 256 sheep, 41 cattle during 1995–2003.
- A private non-profit group, Defenders of Wildlife, compensates livestock owners for the value livestock proven to have been killed by wolves.
- Research is underway to determine impact of wolf restoration on cougars, coyotes, and elk.
- Delisting of the wolf from the endangered species list will be considered after the U.S. Fish and Wildlife Service approves management plans from the states of Wyoming, Montana, and Idaho. Wyoming's plan has not been approved; Montana's and Idaho's plans have been.
- In February 2005, wolf management authority transferred from the federal government to the states in Idaho and Montana.

The gray wolf *(Canis lupus)* was present in Yellowstone when the park was established in 1872. Predator control, including poisoning, was practiced here in the late 1800s and early 1900s. Between 1914 and 1926, at least 136 wolves were killed in the park; by the 1940s, wolf packs were rarely reported. An intensive survey in 1978 found no evidence of a wolf population in Yellowstone, although an occasional wolf probably wandered into the area. A wolf-like canid was filmed in Hayden Valley in August 1992, and a wolf was shot just outside the park's southern boundary in September 1992. However, no verifiable evidence of a breeding pair of wolves existed. During the 1980s, wolves began to reestablish breeding packs in northwestern Montana; 50–60 wolves inhabited Montana in 1994.

Restoration Proposed

NPS policy calls for restoring native species when: a) sufficient habitat exists to support a self-perpetuating population, b) management can prevent serious threats to outside interests, c) the restored subspecies most nearly resembles the extirpated subspecies, and d) extirpation resulted from human activities.

The U.S. Fish & Wildlife Service (USFWS) 1987 Northern Rocky Mountain Wolf Recovery Plan proposed reintroduction of an "experimental population" of wolves into Yellowstone. (An experimental population, under section 10(j) of the Endangered Species Act, is considered nonessential and allows more management flexibility.) Most scientists



believed that wolves would not greatly reduce populations of mule deer, pronghorns, bighorn sheep, white-tailed deer, or bison; they might have minor effects on grizzly bears and cougars; and their presence might cause the decline of coyotes and increase of red foxes.

In 1991, Congress provided funds to the USFWS to prepare, in consultation with NPS and the U.S. Forest Service, an environmental impact statement (EIS) on restoration of wolves. In June 1994, after several years and a near-record number of public comments, the Secretary of the Interior signed the Record of Decision for the final EIS for reintroduction of gray wolves to Yellowstone National Park and central Idaho.

Staff from Yellowstone, the USFWS, and participating states prepared for wolf restoration to the park and central Idaho. The USFWS prepared special regulations outlining how wolves would be managed as an experimental population.

Park staff completed site planning and archeological and sensitive plant surveys for the release sites. Each site was approximately one acre enclosed with 9-gauge chain-link fence in 10 x 10 foot panels. The fences had a two-foot overhang and a four-foot skirt at the bottom to discourage climbing over or digging under the enclosure. Each pen had a small holding area attached to allow a wolf to be separated from the group if necessary (i.e., for medical treatment). Plywood boxes provided shelter if the wolves desired isolation from each other.

Relocation & Release

In late 1994/early 1995, and again in 1996, USFWS and Canadian wildlife biologists captured wolves in Canada and relocated and released them in both Yellowstone and central Idaho. In mid-January 1995, 14 wolves were temporarily penned in Yellowstone; the first 8 wolves on January 12 and the second 6 on

Released from the cage into the pen

January 19, 1995. Wolves from one social group were together in each release pen. On January 23, 1996, 11 more wolves were brought to Yellowstone for the second year of wolf restoration. Four days later they were joined by another 6 wolves. The wolves ranged from 72 to 130 pounds in size and from approximately nine months to five years in age. They included wolves known to have fed on bison. Groups included breeding adults and younger wolves one to two years old.

Each wolf was radio-collared as it was captured in Canada. While temporarily penned, the wolves experienced minimal human contact. Approximately twice a week, they were fed elk, deer, moose, or bison that had died in and around the park. They were guarded by law enforcement rangers who minimized the amount of visual contact between wolves and humans. The pen sites and surrounding areas were closed to visitation and marked to prevent unauthorized entry. Biologists checked on the welfare of wolves twice each week, using telemetry or visual observation while placing food in the pens. Although five years of reintroductions were predicted, no transplants occurred after

1996 because of the early success of the reintroductions.

Some people expressed concern about wolves becoming habituated to humans while in captivity. However, wolves typically avoid human contact, and they seldom develop habituated behaviors such as scavenging in garbage. Captivity was also a negative experience for them and reinforced their dislike of humans.

Lawsuits

Several lawsuits were filed to stop the restoration on a variety of grounds. These suits were consolidated, and in December 1997, the judge found that the wolf reintroduction program in Yellowstone and central Idaho violated the intent of section 10(j) of the Endangered Species Act because there was a lack of geographic separation between fully protected wolves already existing in Montana and the reintroduction areas in which special rules for wolf management apply. The judge wrote that he had reached his decision "with utmost reluctance." He ordered the removal (and specifically not the killing) of reintroduced wolves and their offspring from the Yellowstone and central Idaho experimental population areas, but immediately stayed his order pending appeal. The Justice Department appealed the case, and in January 2000 the decision was reversed.

Results of the Restoration

Preliminary data from studies indicate that wolf recovery will likely lead to greater biodiversity throughout the Greater Yellowstone Ecosystem (GYE). Wolves have preyed primarily on elk and these carcasses have provided food to a wide variety of other animals, especially scavenging species. They are increasingly preying on bison, especially in late winter. Grizzly bears have usurped wolf kills almost at will, contrary to predictions and observations from other areas where the two species occur. Wolf kills, then, provide an important resource for bears in low food years. Aggression toward coyotes has decreased the number of coyotes inside wolf territories, which may benefit other smaller predators, rodents, and birds of prey.

So far, data suggests wolves are contributing to decreased numbers of calves surviving to adulthood and decreased survival of adult elk in the Yellowstone elk herds. Wolves may also be affecting where and how elk use the habitat. Some of these effects were predictable, but were based on research in relatively simple systems of one to two predator and prey species. Such is not the case in Yellowstone, where four other large predators (black and grizzly bears, coyotes, cougars) prey on elk—and people hunt the elk outside the park. Thus, interactions of wolves with elk and other ungulates has created a new degree of complexity that makes it difficult to project long-term population trends.

The effect of wolf recovery on the dynamics of northern Yellowstone elk cannot be generalized to other elk populations in the GYE. The effects will be depend on a complex of factors including elk densities, abundance of other predators, presence of alternative ungulate prey, winter severity, and—outside the park—land ownership, human harvest, livestock depredations, and human-caused wolf deaths. A coalition of natural resource professionals and scientists representing federal and state agencies, conservation organizations and foundations, academia, and land owners are collaborating on a comparative research program involving three additional wolf-ungulate systems in the western portion of the GYE. These ongoing studies began 3–5 years ago; results to date indicate the effects of wolf predation on elk population dynamics range from substantial to quite modest.

Delisting

The biological requirement for removing the wolf from the endangered species list has been achieved: Three years of 30 breeding pairs across the three recovery areas. However, the states of Idaho, Montana, and Wyoming must have management plans that are acceptable to the U.S. Fish and Wildlife Service (USFWS) As of March 2006, Montana and Idaho have met this requirement, Wyoming has not. As a result, day-to-day wolf management has been transferred to the states of Montana and Idaho. (This does not mean wolves have been delisted.) Wolves in Wyoming are still managed by the USFWS. This change does not affect wolf management in Yellowstone.

See Chapter 2 for more information on changes to the ecosystem.

See Chapter 7, "Wolf," for updates on wolf populations, including the decline due to disease.

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Additional Information from Yellowstone National Park

www.nps.gov/yell

Yellowstone Science, published quarterly. Free; available from the Yellowstone Center for Resources, in the Yellowstone Research Library, or online at www.nps.gov/yell.

Yellowstone Today, park newspaper. Free at entrance gates and visitor centers.

Site Bulletins, published as needed, provide more detailed information on park topics such as bison management, lake trout, grizzly bears, and wolves. Free; available upon request from visitor centers.